Food Manufacture

Incorporating Canning, Packing, and Preserving

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British Plant.

IT WOULD be interesting to know the extent to which overseas countries realised, previous to the founding of FOOD MANUFACTURE, that food processing plant and equipment of first-class quality were produced by British firms. There is evidence that they were kept in a most extraordinary state of ignorance. Thus an Australian reader writes us as follows: "We specialise in the technology of foodstuffs, and frequently have occasion to order plant on behalf of our clients. Most of the specialised equipment in food manufacture imported into Australia has been of American origin, *and it is most refreshing and encouraging to observe what a wide range of British equipment is now available for the purpose.*"

Within a few days of receiving this letter we had another from a reader in New Zealand to the effect that this journal had for the first time brought to his notice the fact that glucose was manufactured in England. Previously he had been under the impression that it was obtainable only from America. He stated there was a market in New Zealand for British glucose, and wanted further information as to the manufacturers.

These are two cases; there must be many others. Under such conditions one would be surprised if British manufacturers were able to sell any food processing plant and other products at all to overseas countries.

Good News!

We have at last discovered some common sense in the daily press. By now it is rather "stale," but is worth noting. On April 25 the *Daily Express* printed an article on "How they make Tomatoes and Turtles into Soup.—Laboratory Tests to Ensure Purity of Tinned Food.—Factory as Clean as a Hospital." We should like to see more of this sort of thing brought before the general public.

We read: "I would like to impress on you three things," said my guide, as we started out: "One, that these works are kept as clean as a hospital from top to bottom; two, that we have increased our export trade enormously in the last three years; and, three, that when we label a pot 'chicken and ham' that pot *contains* chicken and ham. What is on the label is in the jar." The "guide," by the way, was described as looking like a doctor about to operate, but was, in reality, a bachelor of science in control of the works laboratory.

Sanity?

On the other hand, we came across the following remarks in *Health For All* (January issue). Whether or not they are to be taken seriously is unknown to us. Possibly they have strayed into the wrong journal by mistake, although it is questionable if they would not have been considered too subtle even for *Punch*:

"*Q.*—What is your opinion of beef extract as a tonic and food for invalids?"

"*A.*—All beef extracts are harmful and should be avoided by the invalid and those in good health. Their value is supposed to consist in their stimulating qualities, and they undoubtedly produce this effect; but because a food or drink is stimulating is sufficient reason for keeping away from it. Beef extracts consist chiefly of the *impurities and poisonous matter* of the meat, and these being substances which the body cannot use as nourishment, they are actually a drain on the vital energy."

We would like to know how something can be stimulating and at the same time act as a drain on the vital energy.

Canning after Freezing.

Recent scientific investigations into "rapid-freezing" are expected to lead to the expansion of the mackerel canning industry on Canada's Atlantic coast as well as improved trade in scallops. The investigations were conducted at the Halifax (N.S.)

station of the Dominion Biological Board, where Mr. Ernest Hess, bacteriologist, established the fact that mackerel treated by the "rapid-freezing" or brine-freezing method can be kept for over two months before canning and afterwards not be distinguished in appearance or flavour from fish canned immediately after landing.

Scallops treated by the same process and kept in storage for several months were also found to be equal to those fresh from the sea.

Although canned mackerel is an excellent food, not much progress has hitherto been made in the canning of this fish, because they are caught at certain times only and the movements of schools are not regular. A canning factory large enough to handle immediately the biggest catch expected in any particular locality before spoiling could never be operated economically. Thus "rapid-freezing" offers a means of holding an abundant catch in perfect condition, providing a steady supply of raw material for the canners.

Scallops do not ordinarily submit to canning, as the flesh turns dark and separates into fibres. Scallops treated by the "rapid-freezing" process in containers protected from the brine have, however, proved, even after several months in storage, to be equal in every respect to those freshly caught.

The Rendezvous.

FOOD MANUFACTURE'S stand at the Canning Exhibition last year became the scene of a real "gathering of the clans," and we hope that this year, at Manchester, it will be so more than ever. We shall look forward to meeting any and every member of the industry who cares to visit us to talk with the Editor and principals of the firm, to indite his correspondence or make his phone calls, and to share the editorial "bowl of tea." It will, figuratively speaking, be a case of the "ever open door" on stand No. 39, and we hope that no one will hesitate to walk right in.

Canadian Canneries.

Canadian packing plants are required to obtain a licence from the Department of Agriculture at Ottawa. They must observe and maintain certain sanitary conditions in their factories. Their products, unless otherwise provided for, are graded as fancy, choice, standard, or second quality, corresponding with first, second, third, and fourth grade. The labels used on the container must be submitted to the Department for approval, and must convey a correct representation of the quality, quantity, and weight of the contents. Inspectors visit the various plants from time to time to see that the regulations are complied with. Goods imported into Canada are subject to similar label requirements.

Bruising of Vegetables.

It is generally known that vegetables deteriorate immediately upon harvesting. The physiological explanation generally given is a loss of sugar manifested by carbon dioxide evolution. Loss of sugar detracts from the flavour in reducing the sweetness. Frequently decidedly "off flavours" verging on the obnoxious develop. Kohman and Sanborn have shown this to be the result of bruising some of the vegetable tissue, resulting in a rupture of the cells. Although such ruptured cells still evolve carbon dioxide in a practically unchanged amount, they lose their ability to utilise oxygen in their respiratory process. The anaerobic respiration resulting is apparently the cause of the off flavours.

Anaerobic respiration in vegetables can be brought about in a number of ways. Mechanical rough handling tends to rupture a portion of the cell. This, nevertheless, manifests itself in anaerobic respiration in proportion to the severity of the bruising that results from the mechanical handling, and the off flavours which develop are proportional to the degree that the oxygen consumption has been reduced. Freezing, rapid or slow, in an atmosphere of air causes the vegetable on thawing and warming to normal temperature almost completely to lose its ability to utilise oxygen. Treating with a saturated salt solution for a few minutes has a similar effect. The consumption of oxygen can also be limited mechanically by covering with water or storing in an atmosphere devoid of oxygen. In each case decidedly off flavours develop. This general principle has widespread application wherever succulent vegetables are handled.

Honey Clarification.

At the Cincinnati meeting of the American Chemical Society, September, 1930 (Division of Sugar Chemistry), it was suggested by Lothrop and Paine that the clarification of honey by bentonite promises to be a valuable process for improving the quality of some low-grade honeys.

Coagulation of honey colloids can be brought about by the addition of appropriate amounts of bentonite, a colloidal clay whose particles are negatively charged. The action is one of mutual precipitation of oppositely charged colloids, and results in a brilliantly clear honey, which is lighter than the original honey in colour.

The colloidal content of honey varies between 0·1 per cent. for some light honeys and almost 1 per cent. for dark honeys (buckwheat). The colloidal particles of most honeys are positively charged, and a reversal of the charge can be brought about by increasing the *p*H of the solution. Maximum precipitation takes place when the particles show no charge (the iso-electric point), which is about *p*H 4·3.

Above this value the colloidal particles are negatively charged; below it, they are positively charged.

Citrus Research.

By now the new citrus by-products laboratory of the U.S. Bureau of Chemistry should be completed. It is situated at Winter Haven, Flor., the centre of the Gulf citrus fruit belt. The immediate programme includes work on some of the most important problems affecting the Florida citrus industry.

H. H. von Loesecke, senior chemist, and formerly research chemist in charge of by-products and biochemical research for the United Fruit Co. at Boston, Mass., will be in charge of the new laboratory. Mr. von Loesecke recently left Washington for his new duties in Florida, and plans an immediate study of methods of preserving orange and grape-fruit juice, of developing orange and grape-fruit by-products, and of utilising orange and grape-fruit wastes as stock and poultry feed.

Citrus growers of Florida and the Gulf States have long desired the same benefits that the California citrus industry has enjoyed from the work of the department's scientists at its laboratory in that state.

Vitamins.

A number of interesting papers were read at the Buffalo meeting of the American Chemical Society last month. Light and Frey determined the vitamin potency of a number of malt extracts. Malt extracts vary considerably in their vitamin potency. In general, preparations having a high diastatic activity have a high vitamin B potency. Selected malt extracts may be used as sources of vitamin B. It is possible by properly mashing malt to produce syrups relatively rich in vitamin B.

Kohman, Eddy, and Gurin found that the vitamin C content of grape-fruit is fully that of any other citrus fruit, and that there was no difference between the raw and the canned product in this respect. The vitamin C content of prunes is relatively low, particularly when fully ripened. As regards vitamin A, the conditions are practically reversed. A study of vitamin B disclosed that neither prunes nor grape-fruit responded well to a test for the vitamin B complex.

Isham and Fellers found that the cranberry compares favourably with citrus fruits or tomatoes in vitamin C content. Storage of cranberries for three months had no measurable influence on vitamin C, but nine months storage proved very detrimental. Cranberry sauce, prepared by cooking the fruit for several minutes in sugar syrup, retained practically all of the original vitamin C of the fruit. Cranberries or juice lost no vitamin C when boiled for two minutes. Approximately 75 per cent. of the vitamin C of cranberries was destroyed when the berries were pulped or screened while hot. This is attributed to oxidation effects. Cold pulping, on the contrary, had no appreciable effect.

Phosphorus in Wheat.

Andrews and Bailey found that in wheat bran most of the phosphorus in organic combination is present in the form of phytin, while in wheat germ less than half of the organic phosphorus is present in this compound, and phytin appears to be wholly absent from the starchy parenchyma of the endosperm of the wheat grain. The proportion of phosphorus lipins and nucleo proteins is much greater in the instance of the germ than in wheat bran.

Fish Convention.

Members of the Canadian Fisheries Association met in Ottawa in annual convention on September 14 and 15, according to the official announcement from the Association headquarters in Montreal. Last year the convention was held in Montreal, where the United States Fisheries Association also held its annual meeting at the same time. In 1929 the Canadian convention took place at Prince Rupert, B.C.

Iodine in Shrimp Waste.

The waste from shrimp fisheries has been shown by Vilbrandt and Abernethy to constitute a cattle food rich in vitamins. Parker and Vilbrandt have further examined this waste for iodine (*J. Amer. Chem. Soc.*, 1931, p. 633). The total iodine found was 16·9 parts per million. The greater proportion of this is organically bound. The approximate distribution of the iodine was determined by extraction with selective solvents, from which it is estimated that about 26·7 per cent. of the total is combined with lipoid material and the rest with protein substance. No thyroxine could be detected. Incidentally, a full report on the utilisation of shrimp waste appears as the U.S. Bureau of Fisheries, Document 1078, published in 1930.

Gel Strength.

A simple method of comparing the gel strength of fruit juices and pectin preparations is given by L. Geret in *Mitt. Lebensm. Hyg.*, vol. 21, page 116, 1930. The details are as follows: Add 5 c.c.s of alcohol to 15 c.c.s of a fruit juice or pectin solution, and place the mixture in a narrow tube. Leave it for an hour at 0° C., and then compare its gel strength with standard jellies which have been previously prepared.

A scientific study has recently been published of the gel strength of various fruit juices and sugar solutions (see W. Ziegelmayer, *Kolloid Zeitschrift*, vol. 52, page 243, 1930). Viscosity measurements show that black currants had a very high gel strength. Next in decreasing order came unripe gooseberries, certain apples, unripe apples, ripe

gooseberries, and rhubarb. The jellies were most easily obtained when the acid content was high, except in the case of black currants. At the optimum acidity the best sugar concentration to use is 60 per cent. of the weight of the fruit juice. Stirring and cooking aid gel formation.

Fat of Frozen Meat.

In last month's notes we commented on the work being done on low temperature methods at Cambridge, and we pointed out the importance of changes in the fat of meat during storage, which bring about an unpleasant flavour. In this connection the work of Lea (*J. Soc. Chem. Ind.*, 1931, vol. 50, pp. 207-212 T) is of considerable interest. He has investigated the changes in the free acidity and superficial oxidation in the fat of carcases of lamb during pre-cooling, cold storage at various freezing temperatures, and at ordinary temperatures, subsequent to storage. The maximum values reached for free acidity were about 1·2 per cent. (as oleic acid) for external fat and rather less for kidney fat; twenty-four hours' pre-cooling at the ordinary temperature produced no signs of superficial oxidation and no definite increase in susceptibility to oxidation during subsequent storage. The fat of carcases held at −5° C. or below for seven months showed no oxidation sufficient to affect the flavour after three days' exposure to ordinary temperatures. No visible growth of moulds or fungi occurred at storage temperatures of −10° C. or −20° C., but growth was not inhibited at −5° C. In no case did micro-organisms appear to be present in the fat when the meat was held for three days after storage at 12° C.

U.S. Fish Research.

To-day we received another reminder of overseas activity in promoting the fishery industry, in the shape of Investigational Report No. 1, "The Menhaden Industry," by R. W. Harrison, U.S. Department of Commerce, Bureau of Fisheries.

This report, occupying 113 pages, submits the results of its investigations, and, as pointed out, the application rests with the factory operator. No doubt the latter will quickly respond, since the report indicates that there are many opportunities for improving the general condition of the menhaden industry, such as by reducing losses and improving the general quality of the products. In preparing the report every effort has been made to point out the losses, in some cases to evaluate them, and to discuss on the basis of data obtained certain methods of overcoming the existing difficulties.

This is the type of report which is of direct interest and service to industry. It represents economic-technical investigation as distinct from scientific-technical research. Both should run together; what we lack in this country is generous provision for the former.

Citrus Canning Waste.

In the *New York Journal of Commerce* it was recently stated that the American Cyanamid Co. had brought to a successful conclusion experiments by which the refuse of citrus canning and juice extracting plants is converted into a new and valuable fertilising material. It appears that the skins, seeds, and "bag" of grapefruit and oranges can be made on a commercial scale into a fertiliser containing more than 4½ per cent. of nitrogen.

The citrus waste is first partly dried and ground into a rather coarse, mealy mass, which is then mixed with certain proportions of cyanamide (calcium cyanamide, $CaCN_2$—sometimes known as "lime nitrogen," "nitrolim," or "cyanamide"—decomposes in water, liberating ammonia; it is used as a fertiliser). After thorough mixing, the material is composted for fifteen days, when the cyanamide changes into urea. Phosphoric acid and potash are also present.

Honey and Diastase.

The evaluation of honey on the basis of the diastase content is not altogether satisfactory and much work is being done on the subject. Braunsdorf (*Z. Unters. Lebensm.*, 1931, vol. 61, p. 411) states that of the 62 German honeys examined 1 had a diastatic value of 62·5, 18 of 23·8 to 50, 18 of 11 to 18, and 8 less than 10; where the value was medium to low the phloroglucinol test indicated strong heating. The value of 23·8 is therefore suggested as a lower limit for first-class diastatic honeys, with 17·9 as the lowest permissible limit for unheated honeys, and 10 for honeys assessed on the basis of the 1930 German Regulations, which stipulate that low diastatic value must not be the result of heating. There are certain honeys with a low natural diastatic value and therefore cannot be said to contravene the German regulations. Fiehe (*Z. Unters. Lebensm.*, 1930, vol. 61, p. 420) has directed attention to certain Californian honeys which have a very low diastatic value. Fiehe determined the diastatic powers of a large number of honeys before and after melting at 60° C. in a steam-heated vessel, provided with a stirring apparatus. Under these conditions the lowering of diastatic value is small, and in many cases nil; the value was reduced to 8·3 in only 12 cases out of 190 and to less than 8·3 in only 2. This leads Fiehe to the view that 8·3 can be considered as a suitable lower limit of diastatic power, and he states that it is becoming recognised as such in the trade.

The difference in the views expressed by two authorities on the subject published, strangely enough, at the same time in the same journal, is rather confusing, and doubtless much more work is necessary before the matter can be considered as satisfactorily settled.

Canned Fruit Salads

By M. A. JOSLYN and E. M. MRAK,
Fruit Products Laboratory, University of California.

An account, by two well-known authorities on fruit products, of the present methods adopted in California for repacking fruits for salad.

CANNED FRUITS for salad, consisting of cherries, apricots, pineapple, peaches, and pears, have in recent years found great favour in England, where the major portion of the California production is marketed. This product enables the small family consumer to have a variety of canned fruits at his disposal at a minimum of cost, and also enables the large eating establishments to prepare a fruit salad at short notice. It rivals the compote in variety, colour, and tastefulness.

Fruits for salad are largely a product repacked from cooked fruits previously canned in syrup. They are commonly prepared from fruit packed in No. 10 cans during the regular fruit canning season and repacked in smaller-sized cans after the busy canning season has ended. This makes it possible for the canner to extend his packing season and thus cut down the overhead charges, and at the same time enables him to employ the regular help for a longer period of time and make use of some of the surplus fruit. In view of these decided advantages and the favour accorded the product by the consuming public, the canning of this commodity has become an institution among the Western packers.

The production of canned fruits for salad in California has grown from a few hundred cases packed by one cannery. The following table (Table I.) shows the number of cases of various sizes of cans and the total pack for 1926, 1927, 1928, 1929, and 1930.

Table I.—Cases of Fruits for Salad packed in California

Size of Can.	*Year.* 1926.	1927.	1928.	1929.	1930.
No. 10	28,000	41,000	49,000	* 1,749,479 total cases, including all sizes of cans	† 1,659,695 cases packed (figure given on basis of cases of No. 2½ cans).
No. 2½	425,000	390,000	487,000		
No. 2	106,000	100,000	120,000		
No. 1 tall ...	324,000	327,000	396,000		
No. 1 flat ...	20,000	19,000	16,000		
3½ in.—8 oz.	85,000	110,000	304,000		
3 in.—8 oz. ...	19,000	26,000	35,000		
Miscellaneous	1,000	1,000	—		
Total ...	1,133,000	1,013,000	1,407,000		

The earliest methods of packing fruits for salad were highly inefficient and involved much hard labour. The cans were opened by hand, the syrup drained into pans, which were carried to the syrup room, where they were emptied into a tank from which it was withdrawn to be used as a base for fresh syrup; the fruit was prepared and packed by hand. During the recanning, much fruit was rendered unfit for use by rough handling, resulting in a mushy fruit. The efficiency of packing fruits for salad was greatly increased when the hand-operated can openers were replaced by automatic openers. Hand draining was eliminated by the adoption of mechanically operated can drainers. But even with the use of these mechanical contrivances the packing of fruit salad was very inefficient, requiring much labour and causing the loss of large quantities of fruit by rough handling.

To avoid losses of fruit in repacking, several canners have attempted to pack fruits for salad during the busy fruit season without marked success. In the first place, the necessary heavier processing of the fresh fruits resulted in a darkening and in a poorer texture of the various fruits in the mixture, as some of them were over-processed during the heating necessary to preserve others. In the second place, it was difficult to secure all the fruits in the same state of maturity, as the fruit seasons do not as a rule overlap each other to any great extent. Finally, it was difficult during the rush of a busy fruit season to give the product the necessary attention.

The present commercial tendency in increasing the efficiency of the packing of fruits for salad is in developing better methods of repacking the canned product. However, the freezing storage of fruits in syrup while in season for use in the later canning of the product is being experimented with and has been found successful by one cannery. Halved yellow cling peaches were packed in a 25° Balling syrup in 30-pound slipover-top enamelled lined cans, using a perforated cone to keep the fruit submerged, and then frozen at 0° F. and stored at 15 to 20° F. The frozen product was prepared for use by partially thawing, slipping the mass out of the can, and thawing in hot water. Directly after thawing the peaches were heated to boiling to destroy the oxidase enzyme and thus prevent subsequent browning. The resulting product was superior in texture and flavour to the recanned and was more economical to handle, as the container could be reused for several seasons. It has been calculated that if the 30-pound tin could be used for three seasons, this procedure would be more economical in spite of the higher cost of storage under refrigeration.

Two grades of fruits for salad are packed, the fancy and the choice. Both consist of apricots, Bartlett pears, yellow cling peaches, pineapple, and maraschino type cherries.

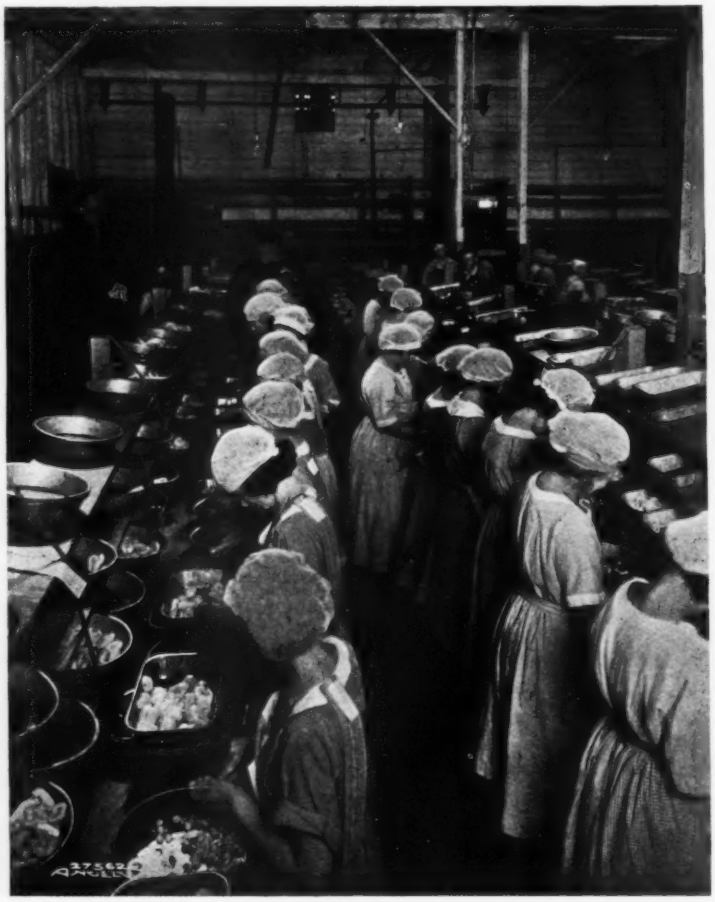
Dyeing the Cherries.

The maraschino style cherries bought in No. 10 cans have to be specially dyed for fruits for salad, as

* Only data available at present for 1929.

† First time the production has been calculated on basis of cases of No. 2½ cans.

otherwise the dye is apt to be leached out and colour the light-coloured peaches and pears in contact with them an objectionable pink. It has been found that erythrosine is more suitable than ponceau-3R and amaranth for dyeing maraschino style cherries to be canned with other fruits for salad, even though the cherry is a lighter pink in colour. However, although erythrosine has less tendency to bleed and discolour other fruits, difficulty in obtaining rapid and uniform penetration of the cherries by the erythrosine is encountered during the dyeing process. It has been found recently by R. N. Jeffrey and W. V. Cruess* that the hydrogen ion concentration is of great importance in dyeing cherries with erythrosine and in fixing the colour. They have found that rapid dyeing of the cherries can be accomplished by adding erythrosine in dilute (0·3 to 0·4 per cent.) sodium bicarbonate solution, and that practically complete fixation of the colour is then obtained by adding a dilute solution of citric acid (approximately ·05 per cent.). A variation of this method has been used commercially. As a further precaution the light-coloured fruits are separated from the cherries, which are placed at the bottom of the can. Some bleaching of the cherries occurs where they come in contact with the can.



Coring Table.

This operation consists only of coring. Pans of cut pears are taken from conveyor, cored, and graded generally into two sizes. Pans of cored pears are then placed upon conveyor which travels on to canning table. Here again having the cores in separate pans permits more adequate inspection.

Opening and Draining.

The procedure in one cannery is to adjust can sealers to act as automatic can openers. The canned fruit in open lugs is trucked from the warehouse to these can sealers. The cans are fed in by hand and the tops are sheared off. The opened cans are conveyed to a unique improvised drainer, where a part of the syrup is removed from the cans by tilting a row of about six cans at a time into a tank. The slightly drained cans are conveyed to a table, from which they are stacked in piles on the floor. From these piles the cans are removed as needed and the contents are shifted to suitable shallow pans, from which the product is transferred into smaller cans. The pans of fruit are conveyed to the canning tables on rolling trucks, used in canneries for handling trayed cans.

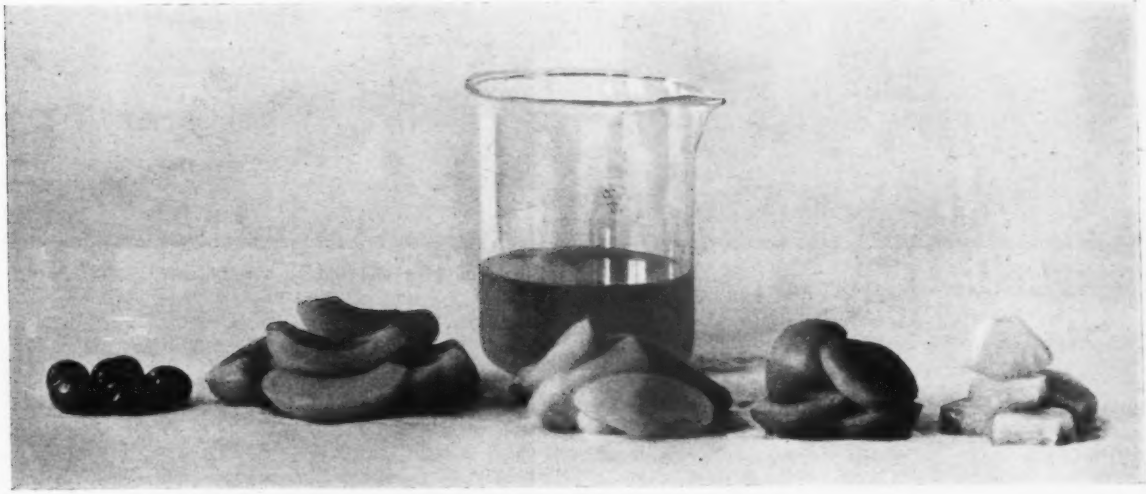
It has been found that a great deal of the loss attendant on the repacking of the soft fruits such as pears could be decreased by handling the fruit in the syrup rather than completely drained. The fruit has a tendency to float in the syrup, and can be handled easier and with less "mushing" than in the dry state. For this reason the syrup is not completely drained from the fruit in the first drainer. Only enough syrup is removed to avoid sloshing during subsequent handling of the No. 10 cans.

In some canneries using a similar general procedure the cans are not drained after leaving the openers. The opened cans are carried on a belt conveyor along an aisle across from the packing table. Men in the aisle empty the entire contents of the cans into specially designed copper bins, each of which has a syrup drain and plug. The drain is kept plugged until all of the fruit is packed into cans, so that the fruit may be in syrup and receive a minimum of rough treatment. When all of the fruit is canned the plug is pulled and the syrup runs by gravity to a syrup line, from where it is pumped to the syrup room on an upper floor.

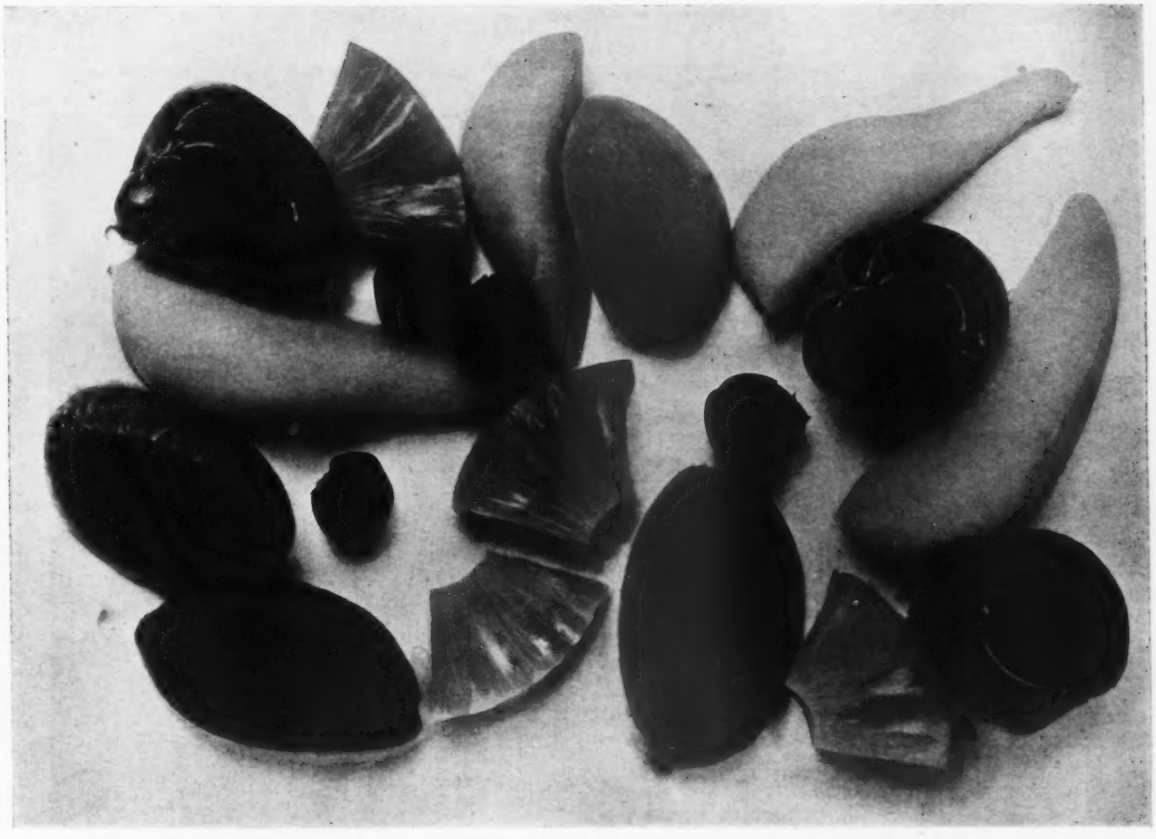
Loss in Fruit.

However, loss is incurred even in handling fruit in this manner. The loss in repacking is more marked in the case of soft fruits such as pears. The mushy fruit is discarded, as its volume is small and will not merit the extra handling for repacking for

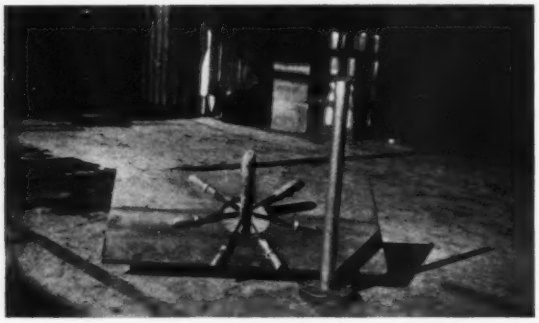
* R. N. Jeffrey and W. V. Cruess, "Effect of Hydrogen ion Concentration in the Dyeing of Cherries" (*Ind. Eng. Chem.*, 1929, **21**, 1268).



Contents of a 2½ Can of Fruits for Salad.



Variety of Fruits for Salad.



A Pineapple Cutter with the Plunger at End of a Hollow Tube.

Each slice of pineapple is cut uniformly into eight pieces.

second grade pie fruits. As a typical example of the waste incurred in repacking, the following table gives the loss in the various fruits for a pack of 1,600 cases of finished product. The listed waste in pears is unusually high, and generally runs around 400 pounds.

TABLE II.—DAILY WASTE IN REPACKING FRUITS FOR SALAD

Fruit.	*Lbs.*
Cherries	3
Pineapple	20
Apricots	85
Peaches	160
Pears	655

Cutting.

At the canning table the pear and peach halves are cut in two or in thirds, depending upon their size, before canning. Thus, for No. 2½ cans the fruit running less than thirty or thirty-two pieces per No. 10 can is cut in thirds along the long axis, fruit running thirty-two to thirty-three pieces per can is cut in halves, and fruit running over thirty-eight pieces per No. 10 can is halved for use in 8-ounce cans.

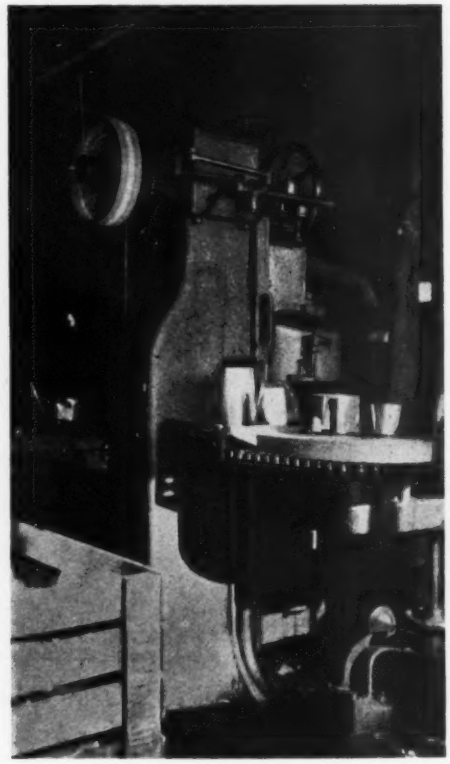
Pineapple.

Pineapple broken in pieces of suitable size in No. 10 cans, or the best grade of pineapple packed in No. 2½ cans, is used in fruits for salad. The latter fancy grade of pineapple is used at this plant and cut into suitable pieces of uniform size by a special operator. The slices are removed from the No. 2½ can and are ringed on-a-stick by the hole through their centre. A plunger is then pushed down on top and the slices cut by pressing against suitably arranged knives. The pieces of pineapple fall into a shallow pan in which this cutter stands. The former practice of cutting the sliced pineapple in the can was not satisfactory, since movement of the slices in the can resulted in variously sized pieces. The cut pineapple is placed in the pans on a rolling truck and trucked to the canning table.

Canning Tables showing the Slotted Top and Syrup Receiving Trough.

Can Drainer.

The operator is holding the handle.



A Can Sealer converted into a Can Opener which Operates by Shearing the Tops off the Cans.

Filling.

At the canning table the empty cans to be filled are conveyed on a chain type conveyor and the fruit added in the following order: Cherries, apricots, pineapple, peaches, and pears. This order is maintained to prevent the coloration of the light fruit by any dye leached from the maraschino cherries.

The canning tables are operated on the unit system. Each woman, or group of women, has but one thing to do. For instance, two women cut peach halves into quarters and add them to the cans as they go by, another woman adds apricots, and so on.

Syruping.

The canning tables are equipped with a slatted top over a syrup-collecting trough. The syrup from the shallow pans from which fruit has been removed is emptied into this trough. This is connected by means of an underground pipe to the draining tank at the can opener and to a blending tank in the syrup room. The mixed syrup is pumped to the syrup room overhead. The mixed syrup, which is used as a base, is brought to 16° Balling by the addition of either sugar or water. The syrup from the fancy fruit, canned in No. 10 cans, generally cuts out at about 20 to 24° Brix, and that from the choice fruit at about 21 to 22° Brix.

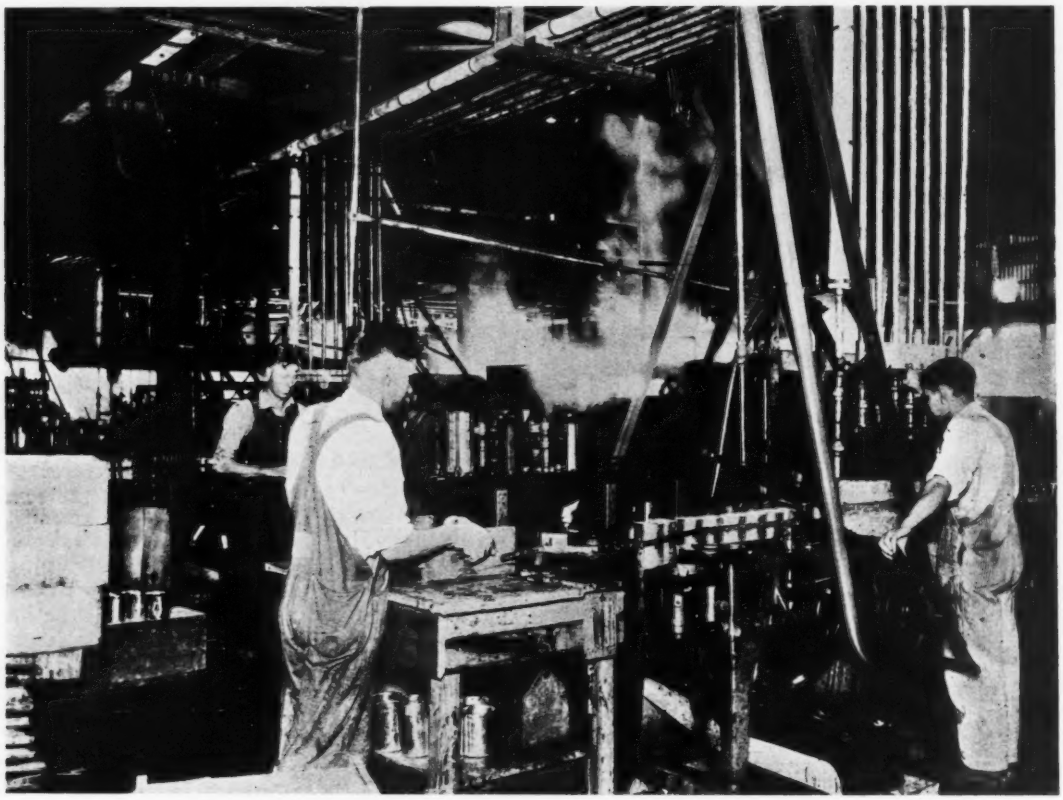
The syrup from the blending tank is filtered through excelsior to remove pieces of fruit and other suspended material and brought by the addition of sugar to the required concentration, heated to boiling, and added hot to the fruit in the can. Prolonged boiling is impossible, as the syrup foams very badly. Upon storage the clear syrup clouds up like the syrup in the can. For fancy fruits 38° Balling syrup is used for No. 2½ cans, 34° Balling for No. 1 tall and No. 1 flat, and 32° Balling for 8-ounce cans. For choice fruits 26° Balling syrup is used for all sizes of cans. No choice fruit, however, is canned in 8-ounce cans. This fluctuation in the concentration of syrup used for fancy fruit is due to the difference in the ratio of the weight of fruit to syrup in the various sizes of cans. The cut out syrup on all sizes is practically the same.

Exhausting and Processing.

Since the fruit used has been previously sterilised the canned fruits for salad are given a light process. For example, for No. 2½ cans the process consists of an eight-minute exhaust at 192° F. and a nine-minute cook at 121° F.

It must be remembered also that all the lines used must be of temporary rather than permanent design, and so constructed as to assure ready removing in preparation for the foilowing canning season.

General View of the Preparation Room of a Californian Cannery.



A Typical View of Canning Lines in California.

Waste Cans.

The disposal of the empty opened No. 10 cans and No. 2½ pineapple cans, a problem for some of the canners, has been solved at this plant. The empty cans are trucked away by a person who uses them to construct tin toys for the children here and abroad. Other canneries have installed presses for flattening out and baling the cans, to be sold as tin scrap.

Enzymic Clarification of Fruit Juices

AN improved method of clarification of grape juice, cider, and fruit juices in general has been developed at the New York State Agricultural Experiment Station (see Kertesz, *Bull.* 589; also *Tech. Bull.* 178, and *Circular* 124, Sept., 1931). The principle of the new method is the use of an enzyme produced by micro-organisms grown under certain specific conditions. On the basis of the work done at this station an enzyme preparation has been developed commercially. This is a clear, practically tasteless liquid, and is standardised for clarifying action by the manufacturer.

The enzyme decomposes the pectin, an essential part of the fruit colloids, but no change in the other important constituents of the juices or in flavour is noticed.

When the pectin is decomposed the rest of the colloids responsible for the cloudiness of the juice are precipitated and settle to the bottom of the container, leaving a crystal-clear juice. The juice should then be pasteurised to stop further action of the enzyme, bottled, and pasteurised or benzoated to preserve it. The clarification can be directed in such a way that the clear product is ready for bottling in a few hours or a day after the beginning of the process.

It is also interesting to note that clarified fruit juices give sparkling, clear jellies. Grape juice gives a dark purple transparent jelly.

Starting a Canning Factory

Last year the National Development Bureau, Department of the Interior, Canada, issued a report on the fruit and vegetable canning, preserving and drying industries, with special reference to Canada. The main object of this report is to call attention to the growing consumption of fruits and vegetables in their various preserved forms, and to the opportunities for the further development of these industries. Much of the report is devoted to Canadian conditions, and detailed statistics are given, but an interesting review of foreign markets is also included.

The following has been abstracted as being a useful summary of the main considerations that have to be taken into account by anyone starting business in fruit and vegetable canning.

The Plant

Location.

SEVERAL FACTORS should determine the location of a canning factory, the most important of which is the supply of raw materials, and the others, which are hardly of less importance, a plentiful supply of good fresh water, availability of suitable help, and adequate transportation facilities.

The economics of production will determine in a very large measure the location of a factory with reference to labour, raw materials, and shipping facilities. The order of the importance of these factors will not be the same in each line of canning, but will be dependent upon the amount of labour required, the nature of the raw materials as to perishability, and the amount of waste. In the case of fruits requiring much hand labour, or a factory operating over a considerable part of the year, it will be found more economical and satisfactory to haul the product by rail or truck rather than to transport the help. In the case of corn, where the waste in husk and cob is such a large part, and where machinery is displacing workers, the reverse will be true. Peas formerly belonged in the same class as corn, but as only the shelled peas are now being trucked, the factory may be located at any good site. Choosing a location with reference to labour should be made dependent not so much on getting near, or in, a city or large town as in a vicinity that will attract the better class of female labour.

There is no question as to the advantage of locating a factory near the fresh material. It is a necessity for the proper handling in the case of some products, such as asparagus and corn, and is desirable in all cases, for it ensures the collection of the fruit or vegetables at the right time and tends to lessen losses from deterioration.

The Small Plant.

Modern tendency is towards the conducting of canning operations on a large scale. Such procedure has manifest advantages in the purchase of graded supplies, in the savings effected through mechanical equipment, in the employment of more skill, thus avoiding losses, and effecting savings in by-products and in sales opportunities. The small packer, on the other hand, must find a locality with a limited supply of some product which can be purchased cheaply and where there is an abundance of labour, or he must depend upon the turning out of a quality product, an exceptional motive which is slowly recognised or rewarded. Equally good packing can be done in the large or small plants if the same skill be employed. The volume of the output does not necessarily furnish a criterion as to quality.

Some products such as apples, pears, berries, grapes, tomatoes, asparagus, cabbage, corn (Maryland style), beans (ungraded and cut), kraut, cauliflower, celery, sweet potatoes, carrots, spinach, and beets require much hand work in their preparation and only the simplest mechanical equipment, and these may be packed in small units.

Equipment.

The kind and amount of equipment are determined solely by the product or products and the volume to be canned. Some products, like corn, peas, and green beans, require much special equipment; others, such as beets, carrots, sweet potatoes, cabbage and cauliflower, need merely that which is common to

most factories using pressure cookers. A grader is about all that is required for beets, carrots, or sweet potatoes. Spinach is handled best with special washer and blanchers. Asparagus needs little aside from trimming tables and some wooden blancher baskets. Dry white beans or kidney beans require a common soaking equipment. A scalder is the only distinctive piece of apparatus necessary for handling tomatoes. For pulp and purée, a cyclone, finisher, and evaporator, either open or vacuum, are a necessity, and the cyclone can also be used for pumpkin and squash. Nearly all the fruits can be handled over the same equipment. The peach and apricot need the lye peeler and the blancher. The filling tables, syrupers, exhaust boxes, closing machines, and cooker are the same.

The catalogues of the various manufacturers of canning machinery might lead one to think that very elaborate outfits were an essential. Certain pieces are necessary to do a special kind of work, others are economical as part of a unit, and still others may be desirable in order to reduce the number of labourers. The amount of equipment should be determined in a measure by the quantity of intelligent labour available. It is surprising how much can be done in some factories where the machines are arranged to be kept in continuous operation compared with others of much larger size, working only at intervals.

Water Supply.

The question of the water supply should be a very important one in the selection of the site. Few persons have any conception of the quantity of water needed in a factory. One of the largest American packers of peas uses nearly half a gallon per can. Water is necessary for steam, for brine and syrup, for floors, sprinkling the goods, and cooling the cans. All water used in the handling of the fruit at any stage should be fit for drinking purposes, and although that used for cooling, for scrubbing the floors, and for sprinkling does not necessarily need to comply with the same standard as that used on the product, it is preferable that it should do so.

Hard water is objectionable for the boiler supply, for brine or syrup, and for soaking products like dry beans, and should therefore be softened by appropriate methods.

It need hardly be mentioned that good drainage is essential in the case of a plant using such large quantities of water.

Process of Canning

Preparation.

The steps in canning vary with the different products, but there are certain processes common to all, as collecting the product, grading for quality, washing, filling the can, sealing, processing, and cooking. The sequence of steps necessary for the preparation depends wholly upon the product. In general, however, the superintendent attempts to make a bulk grading when each load is delivered. The varieties are kept separate, and materials of the same kind but in different stages of maturity, or showing marked variation in size or quality, are handled separately. Careful grading is followed at nearly every step until the product is placed in the can, and this phase is emphasised from the start. Some of the fruits need little preparation other than picking out foreign matter and defective material, whereas others require peeling, pitting, coring, and sizing. Some vegetables require more work than do the fruits, as threshing peas from the vines, husking and silking corn and cutting it from the cob, snipping and stringing beans, peeling beets and potatoes. A great deal of this work is done by machinery better than it can be done by hand. Peaches are peeled by lye; peas are threshed by a machine at a speed greater than could be attained by a hundred hands, and with a minimum of injury to the product; corn is husked, silked, and cut without hand labour other than feeding the ears to the machine, which is done at the rate of a hundred or more a minute. The work upon asparagus, however, is almost all hand labour, as no machinery has yet been devised that will satisfactorily handle it.

Grading.

Grading to secure uniformity in a product, in both appearance and quality, is a necessity in all high-class packing. Grading for size is very largely mechanical; fruits are passed over screens having standard openings, peas are sifted through perforated cylinders, and beans are graded for thickness over vibrating rolls, and later cut to standard length. Grading for quality, for uniform texture, for colour, etc., cannot be done by machines, but requires handwork. As far as possible this work is done in the early stages prior to washing.

Washing.

The washing that all products receive in a factory is far more thorough than that which is given in a home kitchen. In the packing of peas, which may be considered a typical product of a canning factory, nearly half a gallon of water is required per can. Washing machines of seemingly every conceivable type are in use; various forms of troughs provided with currents of water agitate the product, thus loosening and removing the dirt; perforated cylinders and conveyors work between sprays of large volume, which rinse off the dirt, and high pressure sprays cut and remove the more adherent dirt. Some products are washed several times both before and after blanching or grading. The washing extends to the machines and cans, mechanical washers becoming common in cleaning buckets and pans after each operation.

Blanching.

Many vegetables and certain fruits are given a brief precooking in hot water, the operation being termed blanching. In the case of such products as asparagus, beans, and peas, the object is to remove the sticky or gummy substance from the surface and also to cause a certain amount of softening, which materially assists the processing of such vegetables as asparagus and often improves the quality of the product. In the case of peaches, cherries, and other fruits, blanching ensures better packing and

An Orchard in the Bear River Valley.

(Courtesy of the High Commissioner for Canada.)

greater uniformity in colour. This process is not resorted to for the purpose of bleaching the fruit or vegetables, as many persons have assumed.

Filling the Cans.

The majority of fruits are filled into cans by hand, as they usually have to be arranged in layers. For instance, a definite number of peaches or pears cannot be inserted by machinery to give a uniform content without crushing or injury. All fruits are filled by weight. The reverse, however, holds in the case of most vegetables; corn, peas, baked beans, pumpkin, and often tomatoes, are filled by volume, the work being done by machines. String beans are partially filled by machine, the weight being corrected by supplementary hand filling.

Syruping and Brining.

Nearly all products have a syrup or brine added. All high-grade fruits require a syrup, which contributes equally with the fruit in determining the final grade of the product. Only the lowest grades are packed in water. Vegetables require a salt or a sweet brine, the latter being made with a mixture of salt and sugar. Such syrups or brines are added in amounts sufficient only to preserve the product. Certain vegetables, like tomatoes, squash, and pumpkin, do not need the addition of any liquid.

Exhausting.

After the cans have been filled they are either heated gradually to expel most of the air or sealed in a chamber under partial vacuum. This operation, known as exhausting, ensures cans with properly collapsed ends.

Closing.

The method of closing the cans depends upon the type used. The solder-top cans are sealed by automatic machines, which wipe the tops, place the caps, apply the flux, heat the solder, and close the vent without the introduction of hand labour. The hand-soldering capper or capping steel is seen in only the smallest plants, where it is used merely for patching.

The open-top can is closed by automatic machinery, which places the cover in position and crimps the edge to the body of the can by means of heavy rolls. No acid or solder is used, but a cement substance or paper gasket is interposed between the laps of tin.

Processing.

The final act of sterilising the cans is known as the process, and may be carried on below, at, or above the boiling temperature of the water, depending upon the material. When done below or at the boiling temperature, open water baths are generally employed and the temperature controlled by some adequate device. When carried out above the boiling-point, the work is accomplished in retorts or autoclaves in water or in steam under pressure. By means of the latter any suitable temperature can be obtained. Fruits do not need a temperature above the boiling-point; most vegetables cannot be processed in one operation with safety at boiling. The

(Continued on page 304.)

The Exhaust in Canning

By T. N. MORRIS, M.A.,
Low Temperature Research Station, Cambridge.

The author discusses the pros and cons of the heat exhaust and vacuum closing methods, and outlines a method of improving the ordinary heat exhaust. He clearly points out the main reasons for the necessity of obtaining a good vacuum, and concludes by describing a simple method for measuring the vacuum and the head-space in a can and for the deduction of other useful data.

MUCH HAS been written on the exhaust and vacuum in canning, but, as there are still those who connect exhausting with sterilisation and believe that it is sufficient to remove air from a can or jar of foodstuffs to preserve the contents, perhaps a few more words on the subject may be excused.

It is not intended to trespass on the space of this journal with a dissertation on the elementary gas laws, although without such knowledge the subject cannot be understood. For this the reader must consult a text-book on physics or physical chemistry. Suffice it to say here that exhausting in canning is the removal or displacement of a proportion of the air from the head-space and contents of the can, which is then sealed so that this air cannot return. Complete removal of air cannot, in practice, be effected, and is, indeed, undesirable, since it would result in the collapse of the can. W. V. Cruess states that a No. 2½ size can should, after cooling, show a vacuum of 8 to 15 inches, and it may be added that for this and the smaller sizes the higher value is to be preferred. Large cans such as the No. 10 and gallon sizes, if exhausted too thoroughly, will become panelled, even though an extra heavy tinplate be used; hence with these the strength of the tinplate must be the limiting factor.

Methods of Exhausting.

The Heat Exhaust.—All canners are familiar with the various types of heat exhausters in common use. These work on the principle that air, like other gases, expands according to definite laws when heated. In other words, the actual quantity of air in the head-space is reduced with rise in temperature. This displacement of the air is also supplemented by the expansion of the solids or liquids in the can and by an increase in the percentage of water vapour. The degree of vacuum attained on cooling thus depends on the temperature at the time of sealing. According to Magoon and Culpepper, a can sealed at 200° F. will carry a vacuum of about 16 to 17 inches at 70° C., at 180° F. about 13 inches, and at 130° F. about 5 inches.

In considering the heat exhaust it must be remembered that the hot syrup from the syruping machines at first loses heat to the fruit more rapidly than it can be absorbed from the bath, so that for a minute or two its temperature actually falls and may take seven or eight minutes before it again approaches its original value. The nature of the product must also be taken into account. All fruits and vegetables contain air in the intercellular spaces and in solution in the juices which it requires time to remove, as the following test indicates. Five hundred grams (about 14 ozs.) of sliced apples were placed in a large flask, which was then completely filled as quickly as possible with boiling water. The flask was placed in a bath of boiling water and at once connected with a cylinder for measuring the air driven out of the apples. At first the air came off quickly, 68 c.c. being collected in five minutes. After ten minutes 78 c.c. had collected, and after fifteen minutes 80 c.c. Thus, even at boiling temperature, nearly ten minutes were required before displacement of air had become negligible. At a lower temperature a longer period would have been necessary.

This explains why fruit must be subjected to a reasonably long exhaust period; it also explains the incomplete success of an attempt made at Cambridge to create a satisfactory vacuum in a can by concentrating mainly on the removal of air from the head-space. By this method cans were syruped as hot as possible (this is always good practice), the lids were placed in position loosely, and steam jets were allowed to play on them in a specially constructed steam-box for about twenty seconds. The lids and the head-spaces were thus quickly heated, and the cans were sealed before the syrup had time to lose much of its heat to the fruit. Under these conditions the best vacuum obtainable in canning strawberries was about 11 inches, or 2 or 3 inches less than could be obtained in good commercial practice. The method was particularly unsuccessful with plums, which often project above the top of the can and so do not permit the lid to rest properly in position. It was satisfactory, however, with products which had had previous cooking and contained little or no air.

An Improved Method.

A drawback which the writer has noticed with certain types of exhausters lies in the rather prolonged interval between the exhauster and the sealing machine. During this time the cans remain cooling in the open until at length a cold lid is placed in position and the sealing accomplished. Such a procedure must obviously lower the efficiency of a process which depends to a large extent on the temperature of the head-space at the time of sealing, and it is clear that any measures for reducing this interval

and heating the lids before sealing will have some value.

To illustrate how attention paid to what may perhaps appear to be small details of this kind can result in a definite improvement, tests were carried out in which the steam-box just mentioned was combined with an exhaust of the ordinary commercial type. Two-pound cans filled with blackberries and syruped as hot as possible were given eight minutes in a covered exhaust tank at 180° F. They were divided into three groups as follows:

Group A.—Lidded and sealed immediately after removal from tank. Vacuum, measured at 50° F. after standing for a week, 14·4 inches.

Group B.—Removed from exhaust tank and allowed to remain thirty seconds in the open before lidding and sealing. Vacuum, measured as before, 13·3 inches.

Group C.—Removed from exhaust tank, the lids placed in position and immediately heated by jets of steam in the steam chest for twenty seconds, then sealed immediately. Vacuum, 16·1 inches.

In none of these groups can the vacuum be regarded as unsatisfactory, because for all of them the conditions were reasonably good. This, however, probably makes the figures more remarkable, since it is usually easier to improve on bad working than on good.

If such an arrangement were adopted in practice the device for placing the lids on the cans would have to be moved to a point between exhaust tank and steam-box. There would be no slowing down of the process, and the cans would pass into the cooker hot as at present instead of cold or lukewarm, as would be the case if they were sealed by the vacuum-closing machine (see below). Moreover, with certain products it might be found possible to short-circuit cans direct to the steam-box and so cut out the tank-exhaust entirely, a measure which might prove economical.

This method has a good deal in common with what is sometimes practised in the fish canning industry. In some fish canneries the cans are filled and the lids clinched on loosely so that air can escape when heat is applied. They are then passed through an exhaust tank and, as they emerge, the sealing is completed. This necessitates an extra machine for the first operation, but there is no doubt that such a method, if properly controlled, can be made highly efficient. It is not capable of application to all fruits, however, because any projecting fruit would be crushed and the cans perhaps distorted in any attempt to clinch the lids before exhausting.

Vacuum Closing.

The second important method of creating a vacuum in cans is by sealing them in a chamber from which air has been removed by suction. This is practised with products such as fish and milk, which may be filled cold and which do not in themselves contain much air. An attempt was made last year at Campden to apply the vacuum method to fruit, but without success. It was found that the removal of air from fruit tissues is a matter of time whether heat or suction is used. Hence, although a good vacuum was registered at first in cans sealed in the vacuum chamber, this was quickly lost as the air from the fruit made its way into the head-space. Moreover, when suction was applied to cans which had been filled hot or partially exhausted by heating, the contents immediately boiled out. It was thought that it might be possible to effect a compromise by exhausting at a low temperature and sealing under well-regulated suction, but the method seems to have a good many drawbacks and does not at present promise much success; in fact, the results so far do not equal those obtained by the standard process.

Some Reasons why a Good Vacuum is Necessary.

1. *Prevention of Mechanical Strains in the Can.*—As indicated earlier, the vacuum in a can has nothing to do with sterilisation, since there are many organisms which flourish in the absence of air. A good exhaust is, however, an advantage in cooking, since it lessens the strains on seams due to internal pressure and so prevents permanent distortion. Cruess has collected figures which show that cans sealed at low temperatures—*i.e.*, cans not effectively exhausted—develop a very high internal pressure on cooking. This pressure increases with the temperature of the cooker. A can sealed at 176° F. develops about 14 lbs. pressure at 228° F., 22½ lbs. at 240° F., and 26½ lbs. at 250° F. A can sealed at 122° F. develops 14·7 lbs. at 212° F., and 30·7 lbs. at 250° F. According to Bitting, a No. 2 can buckles with an internal pressure of 30 lbs., a No. 2½ with about 20 lbs., and No. 10 with about 10 lbs.

2. *Preservation of Vitamins.*—One of the great advantages of canned food, especially from the point of view of advertising, lies in the fact that it is a method of cooking food in the absence of air and so protects the vitamins from the destructive action of oxygen at high temperatures. It is obvious, therefore, that for this reason the exhaust should be as thorough as possible.

3. *Prevention of Corrosion.*—It is of the greatest importance to remember that pure tin is not attacked by fruit acids in the absence of a source of oxygen. This is not quite true of tin which is coupled with iron, as in tinplate, but, nevertheless, oxygen greatly increases the removal of tin from plate and allows the acid to gain access to the steel base. It has been shown repeatedly by Kohman and others that excess of oxygen in a can leads to perforation and hydrogen-swell formation, and that by increasing the attack on the metal it promotes metallic discoloration. Unfortunately, the formation of hydrogen-swells cannot be entirely prevented with certain products, however efficient the exhaust may be, but the removal of air provides space for the hydrogen formed during corrosion, and so prolongs the life of the can very considerably. It is therefore particularly desirable to exhaust thoroughly in canning products likely to produce hydrogen-swells, and in this connection the size of the head-space as well as the exhaust is a consideration.

Measuring the Vacuum: The Gases in the Can.

Most canners are acquainted with the small and convenient vacuum gauges constructed to puncture the can and register the degree of vacuum in inches. In the absence of a gauge, the vacuum in the head-space and the head-space itself may be measured in the following simple manner: The can is first weighed to the nearest gram. It is then placed in a bucket of clean water, with the top about an inch under the surface, and punctured cleanly with a sharp instrument near the edge of the lid. After allowing a few moments for water to pass in, it is wiped dry with a cloth and again weighed. The gain in weight in grams represents the volume of water drawn in in cubic centimetres. The can is again placed under water and tilted so that the hole is at the highest point. By alternately pressing and releasing the lid, all the air can be forced out, after which the can is again wiped and weighed. From the data obtained in this way we can calculate the total head-space, the total air remaining in the can, the vacuum in inches and millimetres, and, if we know the dimensions of the can, the depth of the head-space.

If it is desired to analyse the gas in the can, the second weighing is omitted and the gas collected, measured, and analysed in one of the well-known types of apparatus constructed for this purpose. The gas will be found to consist of the nitrogen of the air present when the can was sealed, and, if the can is a sound one, a little carbon dioxide, produced partly from the fruit and partly as a secondary result of corrosion, and, possibly, a little hydrogen, also produced by corrosion. If the can is blown, a large amount of carbon dioxide indicates fermentation, and a large amount of hydrogen excessive corrosion. In any case it is possible to calculate with fair accuracy the quantity of air originally present from the volume of nitrogen measured. From this figure and the total head-space, we arrive at the original vacuum in the can, and so are in a position to form an opinion as to whether any spoilage which may have occurred was connected with a poor exhaust.

Cherry Canning

By FELIX J. KOCH

Describes cherry canning activities in the county of Door on the western shores of Lake Michigan. "Here," writes the author, "they are building stupendous fortunes. They are wedded to the policy of buying whatever will expedite results and they experiment ceaselessly with bright ideas and the latest machinery. The big cherry plant on Sturgeon Bay is the largest and the only completely automatic cherry cannery in the world."

Gathering Cherries.

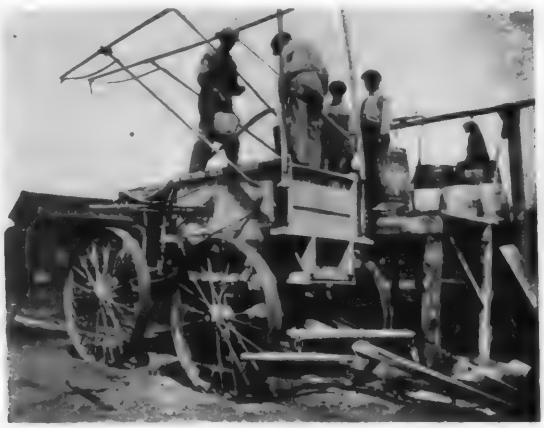
STURGEON, WIS., about two hundred and twenty miles north of Chicago, is the centre of one of the world's largest cherry growing areas. Cherries are brought in the holds of specially designed steamers to the cannery from as far as the east shore of Ellison Bay, Fish Creek, and elsewhere, in addition to the contributions from the county orchards.

Virtually, every grower takes shares in the Door County Fruit Growers' Union in proportion to the quantity of cherries he expects to raise. The grower sells his cherries to the union, which in turn sells them as fresh fruit or for canning purposes.

During the picking season the county is invaded by vast hordes of pickers and mammoth camps are erected. They come from every part of the United States. The union instructs the growers to inform the pickers how many quarts of cherries "on the stem" for the fresh fruit market and how many "off the stem" shall be brought in. The latter work is termed "stripping the cherries on the trees."

It is interesting to follow the cherries as they are

Cherry Orchards.



The Spraying Outfit.

Bringing Cherries to the Cannery.

Landing Cherries at the Cannery.

A Small Cherry Cannery.

A Modern Cannery.

Cherry Canning Line.

Pressing Down and Syruping the Cherries in the Can.

prepared for and pass through the canning operations.

After mechanical washing, they pass over sorting tables, at each of which sit eight women removing the fruit which does not come up to standard.

The cherries then pass to the pitter, which consists essentially of a perforated drum. The cherries are delivered on to the external surface of the revolving drum in such a way that they sit in the holes, and, on being carried to the top, meet with a row of plungers, which force the stones out of the fruit, through the holes and into the interior of the drum. The steady pound of the plungers and the ceaseless patter of stones always has a fascination for the newcomer.

At Cherry, in Michigan, the stones are allowed to dry in the sun, and now and then the great heap is set on fire; afterwards the ashes are collected and strewn beneath the cherry trees.

From the pitters the cherries fall on to a travelling belt, and are again inspected by sorters, who remove all unsuitable fruit.

The fruit is now conveyed to a filling machine, which delivers to each can of the endless procession passing below it the requisite charge.

The cans thus filled—with or without the addition of syrup—are then heat exhausted and afterwards closed and retorted in the usual way.

On one day during our visit exactly 284 tons of cherries were canned, and an average of 200 tons a day is maintained throughout the season, when the canneries are working 16 or 18 hours a day.

Accumulation of Cherry Stones from Pitting Machines.

Cherry Pitting Machine.

The Bakers' Exhibition

A Visitor's Impressions

ONCE MORE the Agricultural Hall at Islington has been the setting for the Bakers' and Allied Traders' Exhibition, and we believe it to have been one of the most successful and interesting demonstrations of all aspects of the baking industry ever held. On the occasion of our visit it was thronged with visitors, and most of the exhibitors were kept busy answering questions and doing business. About two hundred exhibitors displayed their wares, which ranged from elaborate kneading, moulding, and mixing machinery to rat poisons and paper bags. There one could see the latest bakery equipment, the most resplendent shop fittings, cash registers and adding machines, deodorising and cleaning fluids, glassware, refrigerators, and aerated water machinery. Everything required to make the cake, to display it and to pack it and even to sell it, could be discovered somewhere in the hall. It is the baker's job not only to satisfy hunger but also to create it, and the various devices which the modern confectioner employs to make his product appeal to the eye and appetite of his prospective customer are amazing. Particularly interesting were the appliances for mass production of standard lines—to give one example, the pie moulding machines. By pulling a lever a properly moulded pie shell is punched from the dough. Another lever fills it and a third puts the lid on. All this at a pace which is astonishing. Quite a considerable amount of attention was given to the question of bread improvers, and no less than thirteen firms were showing products or giving advice on this very important modern development of baking.

It is impossible to go into details of all the various exhibits—all we can say is that it was a most successful and interesting exhibition, and we feel sure that the trade will derive benefit from it. There was an excellent entry in the competitions, and we found ample evidence of the skill and artistic sense of the modern baker.

Cake and Biscuit Flours.

The evaluation of a flour in terms of its capacity for producing good cakes is a matter of no little difficulty. We have witnessed on more than one occasion the somewhat futile efforts of the judges in cake competitions, and undoubtedly some standard method of scoring is necessary. A well-known firm of self-raising flour manufacturers in this country, which includes a cake competition amongst its advertising activities, issues a score card for the assistance of judges. The main features enumerated are divided into two classes: external, comprising colour, size, and top surface; and internal, such as texture, colour, aeration, and depth of crust. It is of interest to note that the American Association of Cereal Chemists recently formed a sub-committee to report on methods of testing cake and biscuit flours, and this committee has now issued a score card for cake judging. They give 30 points for external appearance and 70 points for internal characteristics. The external features comprise: symmetry, 10 points; volume, 15 points; and crust, 5 points. In the case of internal factors, 30 points are awarded to texture, 25 points to grain—*i.e.*, size and uniformity of cell structure—and 15 points to colour. It is to be noted that in this method of scoring no attention is paid to flavour or odour. This is a very debatable point. In most cake competitions we have witnessed, the judges tasted the cakes, but the advisability of this is doubtful, for in the case of spiced cakes, after the first has been tasted, the palate is valueless for subsequent cakes, and we are inclined to agree that flavour and odour, although important properties of cakes, should be ignored in the cake judgment.

Moisture Testing in Flour.

The rapid determination of moisture in flour is of great importance to the baker, and this applies to the biscuit manufacturer as well as the bread baker. The well-established method, which is used in most bakeries, is the oven method, and usually the samples are placed in at night and weighed again next morning, the loss in weight being taken as moisture. This means that there is a long delay before the moisture content is known, and frequently rapid determinations are necessary. Recent research work has been directed to the shortening of time required for a moisture test. The development may be regarded as falling into three classes. In the first the moisture is actually distilled from the sample by means of an inert liquid, non-miscible with water, such as carbon tetrachloride or xylene. The two liquids separate in a graduated tube and the volume of water is measured. This method takes about fifteen minutes. In the second method, which has been developed by the British Arkady Co., the moisture is recorded by the pressure of acetylene evolved when the sample is mixed with calcium carbide. The third method, which is very intriguing, depends on a dielectric or capacity principle. There are several machines now available on this principle, among which are the Heilan D.K., the Berry dielectrometer, the Limbric and Burton Pitt apparatus, and the Heppenstall moisture meter. These instruments have been tested against standard oven methods both in this country (Fairbrother and Wood, *Industrial Chemist*, 1930) and in America. In the current issue of *Cereal Chemistry*, Coleman describes the results he has obtained, and his main conclusion is that the Heppenstall meter is the most satisfactory. This instrument depends on the estimation of moisture by conducting measurements. The electrical resistance varies with varying moisture content, and the measurement of this resistance is based on Ohm's law, which states that the strength of a current equals the electromotive force divided by the resistance.

(*Continued on page* 304.)

Canning and Allied Trades Exhibition

What Will be Seen at Manchester

Below is given an advance description of those exhibits of interest to our readers which will be seen at Manchester next month. It has been compiled from information kindly supplied by the manufacturers concerned, and will be supplemented in the November issue by a further illustrated commentary.

PROGRAMME OF THE CANNERS' CONVENTION AT MANCHESTER

(*Supplied by the National Food Canning Council*)

Friday, October 30:

Official opening of the Canners' and Allied Trades' Exhibition at the City Hall, Deansgate, Manchester.

Monday, November 2:

5 p.m.—Conference in the City Hall on "Development in Machinery, Cans, and Accessories for the Canning Industry."

9 p.m.—Informal Reunion of Members and Friends. Dancing in the Alexandra Suite, Midland Hotel, Manchester. (Dress optional.)

Tuesday, November 3:

10 a.m.—City Hall, Deansgate, Annual Business Meeting of the Council.

10.30 a.m.—*Private* Conference of Members.

10.30 a.m. to 12.15 p.m.—"Questions and Suggestions relating to Canning Problems."

12.15 p.m. to 1.30 p.m.—"The Promotion of Sales of Home Grown Canned Goods to Institutions and Public Authorities."

3 p.m.—*Private* Conference of Members with Retailers and Distributors, by invitation.

9.30 p.m.—Annual Convention Ball, Alexandra Suite, Midland Hotel, Manchester. (Evening dress.)

Wednesday, November 4:

10.30 a.m.—Open Conference with Exhibitors.

1 p.m.—Luncheon by invitation of the Chairman and Directors of Messrs. Mather and Platt, Ltd., at the Park Works, Manchester, followed by a tour of the works.

Messrs. G. H. Williamson and Sons, Ltd.

THREE CAN closing machines will be exhibited by this firm, each fitted with its own electric motor, so that demonstration runs can be made. The Troyer-Fox type 24 double seamer, which is the smallest of the three, is a semi-automatic type, capable of seaming all sizes of cans up to the A10 or "gallon." It is fitted with a 4-roll head, and has an output of about 30 cans per minute.

The second machine, the Panama can-closer, is fully automatic, and has an output of up to 60 cans per minute, and handles all sizes of open top cans up to and including A2½. A marking device is fitted, and another special feature is the rapidity with which operations can be changed from one size of can to another.

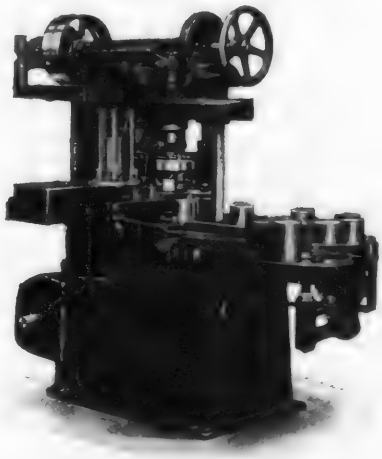
The Troyer-Fox type 9 double seamer is a fully automatic unit, seaming up to 105 cans per minute. A clincher head is incorporated in the mechanism, and this secures the cover on the can sufficiently to prevent any spill prior to the actual seaming process, the cans being fed to the seaming head by a suitably designed flat type chain with bevelled links. A marking device is incorporated, and, if special type covers are used, they may be embossed before they are actually seamed. The head is of the double 2-roll type and all sizes of open top cans up to A2½ can be handled.

Messrs. Joseph Rhodes and Sons, Ltd.

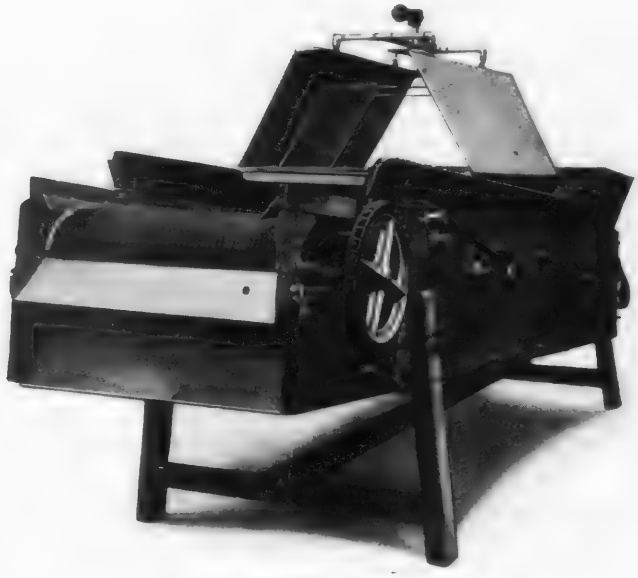
Double seaming machines will be the principal feature on this stand, and five machines of this type will be on view. The No. 26R. automatic is a high-speed 4-spindle machine suitable for closing filled cans as well as for use in can making departments. It produces or caps cans up to 4¼ inches diameter and 5⅝ inches high with an output of up to 200 empty or 150 filled cans per minute according to circumstances. The cans are not rotated during seaming, and there is a special "No can—no cap, no cap—no can" device to take care of any irregularity in the feed. An automatic marking device is fitted for embossing the caps; and another noteworthy point is the reversibility of the double seaming rollers, which gives greatly increased life to these parts.

The 72R. is a modern single-spindle 2-stage automatic machine, embodying many of the special features of the first machine described but of rather lower output. Its special feature is the ease with which it can be changed to operate on cans of various sizes, and on this account it will appeal to manufacturers producing numerous sizes of round cans and who require frequent change overs.

The No. 12 machine takes cans up to 7 inches diameter and 17 inches high, the cans being hand-fed and seamed one end at a time. It has an output of up to 100 gross per day.

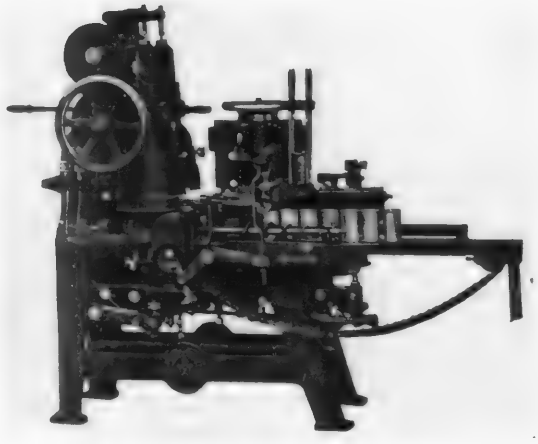


The Rhodes Type 72R Double Seamer.

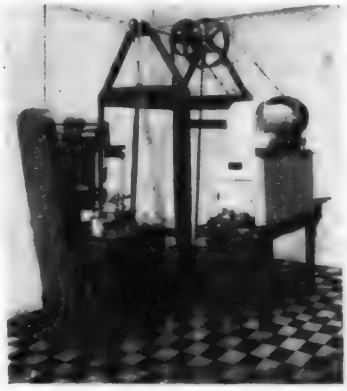


The Ballard Fruit Washer.

The Ballard Rotary Cooker and Cooler.



The Troyer-Fox Type 9 Double Seamer.



The Dewey and Almy Lining Machine.

Of two other double seamers exhibited, the No. 126R. is a semi-automatic, hand-fed, treadle-operated machine, which can double seam oval and irregular shaped cans as well as round, and the No. 2A is a small, but very effective and useful, hand-operated machine for bench mounting.

Messrs. Dewey and Almy, Ltd.

The semi-automatic irregular lining machine on this stand will be seen working on some oval can ends of type usually used in fish canning, although it is also capable of lining rectangular shapes. It has an "M" type dryer working in conjunction with it, and the output is about 20 lined ends per minute, depending, of course, largely on the skill of the operator. It is semi-automatic in action, and necessitates the feeding of each end separately to the chuck by hand, after which the machine is tripped and the lining takes place automatically. The lined ends are stacked in a criss-cross manner and placed in the dryer, which is of exactly similar design to the well-known Model C gas-heated dryer, but is of only half the capacity.

The Thames Board Mills, Ltd. ("Fiberite.")

The Thames Board Mills, Ltd., are again showing specimens of their well-known "Fiberite" cases for packing the many kinds of canned goods, as well as special corrugated packs for jams and bottled fruits.

An interesting feature is the "Fiberite" tinplate pack, which definitely protects the plates from dirt and damp during transport and reduces freight costs.

"Fiberite" cases, state the makers, are carrying this year millions of cans of English produce, an indication of their efficiency in reducing packing costs and carriage charges and the prevention of pilferage.

"Fiberite" cases, when printed with trade mark, name, or slogan, form free travelling advertisements, and this fact is forcibly brought home by the cases on view, on which many well-known names are readily recognised.

Messrs. H. C. Slingsby.

A selection of about sixty trucks, ladders, and castors will be shown by this firm, including two, three, four, and six wheel platform trucks, sliding wheel trucks, and the "rolla-rocka" truck, which can lift, the makers state, half a ton in five seconds.

Messrs. J. and E. Hall, Ltd.

The exhibit of this well-known firm of refrigerating machinery manufacturers will demonstrate, by means of photographic illustrations and models, the application of cold storage to the fruit industries.

Messrs. Hugh Stevenson and Sons, Ltd.

On this stand will be seen a display of fibre cases for canned fruit and vegetables. Messrs. Stevenson have studied the matter very thoroughly both here and in America, and their canned goods cases are guaranteed to stand a breaking strain test of over 300 lbs. per square inch. They are double lined to prevent the friction of the tins wearing the board, and are all made with a vertical grain, a detail which is of great importance.

Corrugated boxes for tomatoes; corrugated cases and trays for jam, honey, etc.; corrugated boxes for sauces and the like; and fibre cases for cheese packing and for other food products, will complete the exhibit.

Messrs. F. J. Ballard and Co., Ltd.

The familiar Ballard automatic canning line, consisting of syruper, disc type water exhauster, variable discharge cooker and cooler, will not be seen on this firm's stand, but a number of detailed improvements have been effected since last year, and the makers inform us, owing to the increased demand for them, that special production equipment has been installed in their works, which has enabled the cost to be reduced, and the benefit of this is being passed on to customers. Space difficulties, however, prevent its exhibition.

The rotary cooker and cooler, which we illustrate herewith, is a recent patent, and has been designed for the benefit of canners who require a comparatively cheap plant which will deal with a large range of cans. This plant is also particularly suitable where floor space is restricted. It is particularly efficient for gallon cans, and the plant illustrated, the makers state, will process 12 cans per minute with a process time of 15 minutes.

It is semi-automatic and requires three girls for operating.

The pea sheller is one of the firm's small sizes, and designed to shell 1,400 lbs., peas and pods, per hour. During the past season it has continuously shelled up to 2,000 lbs. per hour.

Another interesting machine now being made by Messrs. Ballard is the fruit washer. The particular one shown has been in use by a large concern in the South of England during the past season, and has successfully met all demands. As much as 20 tons of strawberries have been cleaned in the ordinary working day by means of this machine.

Messrs. Mather and Platt, Ltd.

A varied and interesting line of machinery will be found on this stand, drawn from the large range of canning equipment of which the firm are makers. This will also be supplemented by a special display of working equipment at Messrs. Mather and Platt's Manchester factory, to which an official visit is being arranged.

The Beth Label Machines, Ltd.

The principal exhibit will be a labelling machine capable of handling, at a speed of seventy-five tins per minute, every size of can used, the label being either fully equal to the width between the rims of the tins or narrower. Unusual efficiency is claimed for this type; they require no skilled supervision, and the method of affixing the label ensures that no paste comes in contact with the tin or leaks on to the face of the label. Users of them include Joseph Farrow and Co., Ltd.; Newbery Bros. (Battle), Ltd.; Joseph B. Dring; W. R. Deakin, Ltd.; Co-operative Whole-

sale Society, Ltd.; Chivers and Sons, Ltd.; Foster Clark, Ltd.; Wisbech Produce Canners, Ltd. (three machines); Batchelor and Co., Ltd.

Messrs. Arthur Holden and Sons, Ltd.

A remarkable collection of fruit, vegetables, meats, fish, etc., packed in tin containers lacquered with "Super Zinnatine," "Sulfatina," or "Zinnatina Marina," or in bottles with caps lacquered in a similar manner will make this firm's stand take on almost the appearance of a canned goods store.

It is of particular interest to observe that most of the firms on the list authorised to use the National Mark for canned produce are represented in the collection.

A further striking feature of the exhibit is a showcase, wherein are compared side by side lacquered and unlacquered containers which have held similar kinds of foodstuffs.

The ravages which acidic fruits, for example, make on unlacquered plate as compared with the beautiful golden appearance of the lacquered container should bring home to everyone the important part a suitable lacquer plays in allowing canners to offer the public fine produce under the most hygienic conditions.

Canning and Packing Equipment: Modern Plant and Processes

The approach of the Manchester Exhibition naturally draws attention to the subject of cannery equipment, and the following description of the latest equipment offered by firms to the various branches of the canning industry should form a useful supplement to the description of the Manchester displays.

AT LAST year's Canning Conference (as will be seen on reference to the FOOD MANUFACTURE issue of November, 1930) special emphasis was laid on the potentiality of a greatly extended fish canning industry for Great Britain. A special meeting on the subject, it will be remembered, was held at Lowestoft as a supplement to the Leicester gathering, and since then further attention has been given the matter. Of a type specially suited for service in fish canneries is the Premier "C.V." vacuum double sealing machine shown herewith. It can deal with tins up to a size 6″ × 6″ at a rate of about 25 per minute, and the tins are not subjected to any heat in order to obtain the vacuum, which is mechanically induced. Thus the tins are actually closed in the vacuum chamber, and for sterilising purposes go only once to the retort after closing, so that any chance of overcooking is prevented. The machines, of course, find application to preserving many other foodstuffs besides meats and fish; for instance, boiled sweets packed under vacuum by this method will remain dry and attractive in appearance, and will not become dull through the sugar crystallising. Also in the case of toffee where butter is used, this will keep indefinitely if the tins are closed by the Premier process, and any likelihood of the butter going rancid and spoiling the sweets is entirely eliminated.

Canning of Green Peas.

Large-scale pea canning is another development of the food preserving industry now firmly established in England, and the two illustrations herewith show some equipment for this purpose, which has originated in Canada, where, of course, pea canning has been carried on extensively for many years. The first is a Chisholm-Ryder viner, made by the Brown-Boggs Machine Co., who are represented in this country by Messrs. W. E. Hughes and Co., Ltd. This viner, it is claimed, represents the maximum efficiency obtainable, and is capable of handling peas from 50 to 80 or even 100 acres. After being threshed in the viner, the peas are conveyed to a cleaner and thence through the various stages of filling, capping, sterilisation, and cooling.

The Brown-Boggs washer in the second illustration is intended for thoroughly cleaning the peas after threshing and removing all stones, gravel, splits, and foreign matter. The peas are fed into the hopper at the centre of the machine and passed over riffles, where stones and similar heavy materials are removed. At the next stage, in the floating chamber, the lighter dross which floats on top is skimmed off, and, finally, the separated peas arrive in the revolving screen, where they are thoroughly washed and discharged.

Double Seaming Square Cans.

The automatic manufacture of cans with rectangular sides and ends, commonly known as square cans, presented difficulties when it followed the trend established in cylindrical can manufacture. For instance, the attaching of tops and bottoms to cylindrical can bodies was a comparatively simple affair in contrast to the attaching of ends to a square body.

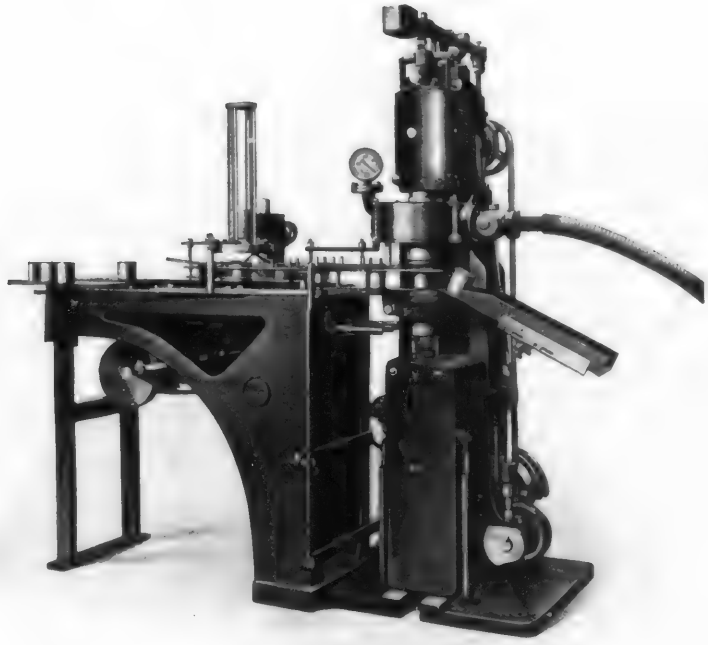
The top and bottom seams of round cans are made by revolving the cylinder and applying a seaming roll to the outer edge. The application of this seaming roll to a square end which represents four corners to each revolution has, however, been completely perfected, and we are showing herewith an illustration of a machine manufactured by the Cameron Can Machinery Co. which is used for this purpose.

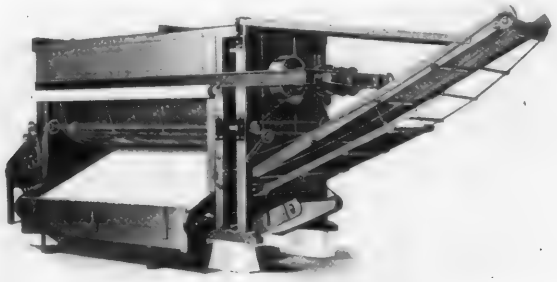
Can making has in many localities been brought to a point of tremendous production, and the type 53 automatic seamer, shown herewith, finds its use in plants of large output.

Right: The Cameron Type 53 Automatic Double Seamer for Square Cans.

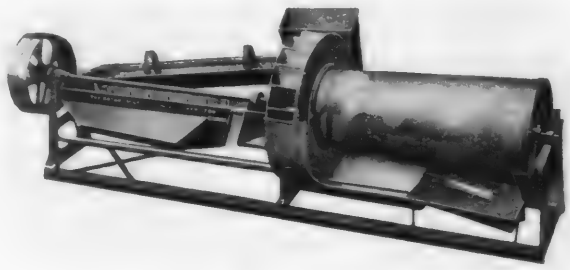
Above: The Improved Type Fraser Vacuum Tin Solderer.

Right: A Premier C.V. Vacuum Double Seamer.





The Chisholm-Ryder Pea Viner.



The Olney Pea Cleaner.

This seamer produces 6,000 seams per hour, and nothing is left to the skill or diligence of the operator. The cans are fed by a moving belt to a revolving dial. This dial carries the can with the end in place, beneath the seaming rolls, which attach the end firmly to the body.

The Cameron Can Machinery Company also produces a surprisingly large number of other devices for cans and containers of every description, including machines for production of canisters, buckets, tubs, tanks, drums, and innumerable other vessels for special requirements.

Vacuum Tin Soldering Machines.

An improved type of vacuum soldering machine has recently been introduced by Messrs. John Fraser and Son, Ltd., an illustration of which is given herewith. It will be seen that the soldering chamber has two doors which lift vertically, so that conveyors may be arranged right up to each door, for the delivery and removal of the cans, the path of which is thus straight in and through. The actual soldering is carried out by an electrically heated soldering iron, as in the previous types, a sight glass being provided in the top of the chamber, which is electrically lit.

Other products of the firm include: (1) A vacuum glass jar sealing machine, for the vacuumisation of all products in glass jars, sealed with the aid of a rubber joint. This machine is being extensively used for the vacuumisation of all sorts of meats in glass, fruits, jams, and many other similar commodities. (2) Milk sterilising machine. This machine is a horizontal agitating retort, and is especially beneficial in the sterilisation of milk and cream, as, by means of agitation, it prevents these products acquiring a scorched flavour. (3) Horizontal and vertical retorts. Messrs. Fraser make these in size to suit all requirements, and it is being found, they state, that the vertical retort is gaining favour in this country. The overhead gear required for raising and lowering the baskets of tins for processing in this latter type of retort is also supplied by them.

Tin Box and Canister Making Machinery.

It would be hard to find any type of machine required for the production of tin canisters for the food industry which is not included in the catalogue issued by Messrs. Bradley and Burch, Ltd., of Ilford. The firm's products include gang slitting machines, which cut the tinned sheets into strips for bodies or the power press; body forming machines for rectangular or oval canisters; grooving and folding machines; automatic side seam soldering machines; end flanging machines, and a variety of power presses. Double seaming machines of several types, with outputs of up to 1,800 seams per hour, are listed; double-seam closing machines for filled cans, and similar machines adapted for use with oval or irregular shaped tins.

Temperature Indicators and Recorders.

Temperature control is a principal feature of many food preserving processes, but it is axiomatic that before the temperature can be controlled it must be known, and this is the function served by the many types of indicating and recording thermometers produced by the Cambridge Instrument Co., Ltd., and by the Drayton Regulator and Instrument Co., Ltd. Instruments made by the latter have been frequently referred to by us. Recently an installation was supplied to the new Kent cannery (see page 300).

The Cambridge mercury-in-steel index thermometers and thermographs are of the non-electrical type. The Cambridge "Dial" thermometer, another, is being increasingly used for applications in which glass thermometers have hitherto been employed, as it possesses obvious advantages in the way of ease of reading with a bold scale.

In connection with their electrical distance thermometer outfits, the Cambridge Instrument Company have recently developed a new thermometer element. The principle on which the measurements are made depends on the variation with temperature of the electrical resistance of a platinum wire. The thermometer element comprises a coil of platinum wire suitably encased and provided with terminals. The resistance of the element at different temperatures is measured on a galvanometer, which embodies a modification of the Wheatstone bridge. This variable resistance is compared with other resistances which do not change with temperature, their value being so adjusted that the bridge is balanced at the commencing temperature of the range of the galvanometer. Any increase in the temperature of the element then causes the galvanometer pointer to move over a suitably calibrated scale.

The new quick-reading thermometer element possesses unique rapid response to temperature changes,

(*Continued on page 304.*)

The New Kent Cannery

A FACTORY at full blast in the heart of Kent's orchards, endless streams of English cans and fruit flowing through English-made machinery, a small mountain of gaily labelled cans bearing the National Mark, a nimble, enthusiastic manager, and smiling workers, is a sight calculated to produce the tonic effects of a week-end at Blackpool.

By the courtesy of the Wisbech Produce Canners, Ltd., we were permitted to visit their new factory at Paddock Wood in the Maidstone district, and rarely has a visit of this nature afforded us greater interest and pleasure.

At present there are two canning lines, which may be trebled or quadrupled by next season, each consisting of a sorting belt, syruping machine (Mather and Platt), heat exhauster (Cooper), double seamer (The Metal Box Co.), and automatic cooker and cooler, fitted with Drayton regulators (Mather and Platt). There is also a sprigger (Brierley, Collier, and Hartley) and a labelling machine (Beth).

These two lines are capable of turning out 2,500 cases (each of 24 cans) per day of 8 hours. This season's work has resulted in the following output:

Plums	... ...	12,000 cases
Loganberries	... ...	10,000 ,,
Strawberries	... ...	6,000 ,,
Cherries	... ...	3,000 ,,
Damsons	... ...	3,000 ,,
Gooseberries	... ...	2,000 ,,
Raspberries	... ...	2,000 ,,
Blackcurrants	... ...	2,000 ,,
Cultivated blackberries	...	1,500 ,,

In addition to this imposing production, the following amounts of fruit have been bottled:

Red plums	... ...	60,000 bottles
Gooseberries	... ...	50,000 ,,
Blackcurrants	... ...	30,000 bottles
Raspberries	... ...	20,000 ,,
Cherries	... ...	10,000 ,,
Blackberry and apple	...	8,000 ,,

We were much impressed by the appearance of the bottled fruit, and great credit is due to Mr. Clarke, the manager. The cherries also deserve special mention; Mr. Clarke claims they are the finest in the world.

That the National Mark people are doing their job thoroughly may be gathered from the fact that they visit the factory twice a week to take away their samples for examination. There should be no fear of the goods falling below standard.

Trade Notes

Food Plant.

The old-established firm of Frederick Braby and Co., Ltd., are manufacturers of all kinds of goods in metal sheet and plate. More recently the firm have turned their attention to the requirements of food manufacture, and their fine aluminium factory at Bristol is now largely employed in this class of goods. These include receiving and storage tanks, vats, pans, trolleys, troughs, chutes, hoppers, etc. Most of these articles are made specially by Messrs. Braby to suit the particular purposes for which they are required, but there are also standard lines.

Apart from actual food manufacture, goods made in this factory include display stands for exhibition purposes, signs, etc., and a recent contract was for welded cylindrical tanks measuring 35′ long × 5′ 6″ diameter × ⅜″ thick aluminium plate.

Besides the aluminium factory, Messrs. Braby have other works at London, Liverpool, Bristol, and Glasgow, and these are capable of turning out work of all kinds in metal sheet and plate-iron, steel, and non-corrodible alloys. The heavier work includes storage tanks, retorts and sterilising plants, jacketed pans, acid eggs, calorifiers, pressure filters, etc., but articles of light gauge are also made.

* * *

Nova Scotian Canned Lobster.

One of the large lobster canners in Halifax reports that the outlook for the 1931 season is uncertain because of low prices prevailing in the chief markets, according to information submitted to the U.S. Department of Commerce.

Fully 90 per cent. of the pack of the Maritime Provinces is exported, chiefly to Great Britain and the United States. The sale of canned lobsters in markets, particularly in Great Britain, has been affected adversely in recent years by the competition of Japanese crab meat. It is reported that the chief competition in the British market at the present time is furnished by Russian crab meat, which is selling at considerably lower prices than even the Japanese product.

It is understood that the quality of last season's pack was quite equal to that of the previous year, and that constant efforts are being made to improve the quality of future packs. The use of "C" enamel lined tins has been responsible for a marked general improvement.

Owing to the prevailing low prices for canned lobsters it has been necessary for the packers to reduce the prices paid to the fishermen for live lobsters. At the present time the prices offered the fishermen are just sufficient to ensure that they will continue fishing.

Screw Tightening Machine.

The screw tightening machine developed by Messrs. Bratby and Hinchliffe, Ltd., of Ancoats, Manchester, who are well-known as engineers to the bottling trades, swing stopper manufacturers, and essence distillers, has been remarkably well received. It is a machine for which there is a recognised use in all factories where a screwcap is required, carrying out the operation, as it does, efficiently and economically, and, at the same time, relieving the operator of thumb and finger strain. In many factories the factory inspector insists upon some form of mechanism for tightening. Moreover, this machine will put on a cap more tightly than it is possible to do by hand.

The screw tightening machine is now well established in breweries and mineral water factories, in some cases with automatic feed. Obviously, it is an attractive proposition for factories engaged in packing various types of foodstuffs, patent medicines, polishes, blacking, etc. It will handle all shapes and sizes of bottles, and also takes a large range of caps. The tension is easily adjusted, and by a few turns of the knurled screw fitted above the screwing head any degree of tightness can be given to the screw cap. It is fitted with a direct coupled motor.

* * *

Personal.

We note that Mr. David Hamilton, B.Sc., A.M.I.C.E., has been appointed representative of Birmabright, Ltd., for the London area. His address will be Abford House, Wilton Road, Westminster, S.W. 1.

We also note that the Broughton Analytical Laboratories have removed their offices and laboratories to larger premises at 3, Ashbourne Grove, Hr. Broughton, Manchester.

* * *

Deplorable Practice.

Our attention has again been drawn to the mean practice on the part of certain firms who, not having stands of their own at a trade exhibition, tout for orders, if not actually by word of mouth, by their presence in the exhibition. We are informed that last year at the Bakers' and Confectioners' Exhibition several firms of considerable standing in the trade were to be seen practically every day during the time this was open.

It is known that such actions met with the strong disapproval of the trade generally. We are advised that firms acting in this manner are liable to the extent of £500. It is to be hoped that the trade will assist the Trades' Markets and Exhibitions, Ltd., not only to rid exhibitions of such firms, but to be in a position to make a handsome contribution to the trade charities.

* * *

Brewers' Plant and Equipment.

We have received from Messrs. Stewardson and Son, Ltd., of Shef field, an interesting illustrated catalogue showing the variety of plant which they manufacture for the brewing industry. Illustrated and described in it are mash-house tuns of various types (insulated and copper lined) wort coppers and copper heads, hop drainers, wort receivers and refrigerators, fermenting-room plant, boiling fountains, etc. The "Barber" patent pulp washer, which is manufactured by the firm, is also described in the catalogue. This machine, unlike most other pulp washers, has no mechanical agitators or worms, as the two cleansing agents, water and steam, which wash and sterilise the pulp, give the necessary motion in less time and with better results.

* * *

Polish Bacon for Export.

Curing of bacon for export is rapidly expanding in Poland. The English market has been found to be the most attractive outlet, and is now absorbing the bulk of the bacon exports of the country, according to a report of the American consul at Warsaw. The extent of the development in this line is shown by the fact that exports in April increased 40 per cent. over March. This state of affairs has been responsible for the establishment of several new curing plants in the country with a view to increasing production to meet expected heavier demand.

There has been a decrease recently in the number of live hogs exported.

* * *

Central Germany is Centre of Canning Industry.

The region sometimes designated as Central Germany, including the Prussian Province of Saxony, the Free State of Saxony, Anhalt, Braunschweig, and Hanover, contains about 40 per cent. of all the fruit canning activities of Germany. The factories of this kind in this area aggregated 79 at the end of the manufacturing year, March 31, 1931, and the production during the year of marmalades, jams, canned apples, and other fruit sauces and jellies totalled over 50,200,000 lbs. The total production in Germany (190 factories) aggregated 114,600,000 lbs. during the year.

Imports of Canned Fruits.

Arrivals of canned fruits at the chief ports of Great Britain during the first six months of this year amounted to about 2,900,000 cases. Peaches, pears, and pineapples accounted for over 70 per cent. of this total.

* * *

New Canning Laboratory.

The new experimental laboratory for the canning industry was dedicated at Stavanger on June 25. Representatives from the Government, the canning industry, and various scientific institutions and organisations were present at the occasion. An interesting programme covering the establishment of the laboratory and the purposes for which its work will be carried on was followed by demonstrations showing the most modern equipment with which the laboratory expects to conduct its experimental research and tests.

Attention was called to the fact that the fish canning industry of Norway in a little over fifty years has developed so rapidly that it has quite naturally made some mistakes and acquired some practices not based on sufficient experience. It is hoped that the new laboratory will correct and improve these conditions and at the same time assist in new problems which may arise, help develop new methods, and standardise tests for products used and manufactured by the canning industry.

* * *

Japanese Canned Foods.

There are indications of Japanese efforts to develop the South African market for canned foods. It is understood that Mr. Soki Hoshino, the managing director of the Canned Foods Association of Japan, who was in South Africa at the beginning of the year, is concentrating his attention on prospective distributors who are in the position to handle his Association's lines, particularly sea food products such as canned salmon and other varieties of fish.

* * *

Frozen Salmon.

An experimental shipment of thirty-five tons of frozen Canadian salmon was landed at Avonmouth Docks, Bristol. This salmon, which took fourteen days in transit, was shipped from Newfoundland on the *Kastalia*. The vans used in conveying the fish to London were refrigerated by means of "dry ice," and it is stated that during this part of the journey the variations in temperature of the consignment were carefully recorded by electrical devices.

* * *

Pectin.

Douglas Pectin, Ltd., have moved their offices from Liverpool to River Plate Wharf, Blackfriars, London. It is understood that Mr. Scotcher will now act as managing director.

Belgian Decree.

All canned foodstuffs imported into Belgium must carry labels in the French language indicating the nature of the product, the name of the manufacturer, and the name of the Belgian distributor. The decree was originally supposed to become effective on January 1, 1931, but the Belgian Ministry of Hygiene promised to postpone its application for six or twelve months.

* * *

Cod Liver Oil.

Commenting on the fisheries by-products industry in Canada, the *Fisheries News Bulletin*, issued by the Department of Fisheries at Ottawa, points out that over 4,400,000 gallons of fish oil, exclusive of medicinal cod liver oil, and more than 22,700 tons of fish meal, were produced in 1929. Including medicinal cod liver oil (91,022 gallons), the oil output totalled 4,506,316 gallons and had a marketed value of $1,845,000 in round figures, while the fish meal production had a marketed value of $1,013,000.

* * *

Danish Lard.

Price is the principal reason for the headway which has been made by Danish lard in Germany. During a large part of the past eighteen months it has sold at a price below that of American lard.

It seems altogether likely that the competition from Danish lard is a permanent development, which will probably continue to increase rather than diminish in the absence of further tariff restrictions.

The Danish exporters are known to be keenly interested in this outlet for a product that has become so important, and are seeking means to develop it. It is rumoured that a central refining plant may be established, either in Denmark or Germany, near the Danish boundary, where Danish lard may be refined and made uniform in quality and appearance.

If, at the prevailing low prices of meat and lard, these products can be exported from Denmark at a profit, there seems to be no reason why the industry should not thrive when prices increase. There is now every indication that the production of hogs in Germany will decrease next year, when local prices of meat and lard may be expected to rise, if other conditions do not develop unfavourably.

* * *

New Dairy at Rotherham.

The Rotherham Society will shortly commence to build a new £15,000 dairy for the pasteurisation of milk. The contractors are the C.W.S. building department, and the architect is Mr. Johnson, of the C.W.S. architects' department. The plant is to be installed by the Aluminium Plant and Vessel Company, and when completed will have a capacity of 400 gallons per hour.

Canned Eggs.

An Oregon (U.S.A.) canning company, who pack chicken in many appetising forms and styles, have added eggs to their list of chicken and fruit products.

The eggs are canned when strictly fresh. The label says that canned eggs, which are cooked under pressure, are "excellent in salads" and "more digestible than eggs cooked otherwise." The pack is in 7-oz. round cans.

* * *

New Flour Mills.

The General Foods Corporation proposes to establish two Canadian factories to manufacture from Ontario-grown soft wheat the widely advertised American food product known as "Swans Down Cake Flour." The Canadian factories are to be located at Windsor and Dutton, which are conveniently situated with respect to areas where soft wheat is grown in large quantities in the south-western peninsula of Ontario. The Canadian subsidiary is to be known as General Foods, Limited.

In Essex County alone about 50,000 acres are devoted to the cultivation of soft wheat, and the establishment of the new industry is likely to result in a considerable increase in the acreage under crop.

* * *

New Milk Factory.

The U.S. Department of Commerce report that the Nestlé Company of South Africa is to erect a complete modern dried milk factory at Estcourt, in the northern part of Natal.

* * *

Technical Classes.

The course in chemical engineering at the Battersea Polytechnic opened on September 21. Lectures by Hugh Griffiths, B.Sc., A.R.C.S., M.I.Chem.E., are held on Monday evenings from 7.15 to 9.30 p.m. and the practical work on Friday evenings from 7 to 9.30 p.m. The lectures will deal with the principles involved in the design, erection, and working of modern chemical plant, and the economic aspect of chemical manufacture. Examples from practice will be given and discussed in detail, as far as time will permit. The lectures will be illustrated by diagrams and drawings of plant in actual use.

* * *

At the Sir John Cass Technical Institute, Jewry Street, Aldgate, E.C., a course of about twelve lectures on the design and construction of chemical plant will be given on Tuesday evenings from 7 to 8 p.m., starting on September 29. Other courses in organic and applied chemistry are held, among which is one on micro-chemical analysis, commencing October 15.

Canning and Packing Equipment (*Continued from page 299*)

steady readings of any temperature within the range of the indicator being obtained in about four seconds after the insertion of the thermometer, and small temperature changes are almost instantly registered.

Food Preparing Machinery.

Pea canning has been carried out for many years on the Continent, and Messrs. C. E. Douglas and Co., Ltd., who are the British representatives of Messrs. Navarre, of France, are able to offer pea canners in this country machinery which incorporates the experience gained by Continental canners. The equipment includes pea shelling machinery of up to 4 tons per hour capacity, with supply regulator and feed elevator, cleaning machines, graders, and blanchers. Complete ranges of plant are also available for peach, cherry, apricot, and plum bottling and canning, and indeed for all fruit preserving, while a special feature is made of the concentrating plant for tomato, grape, lemon, orange, and other fruit juices. The plant for this last purpose is claimed to be unusually simple and efficient, to operate at quite low temperatures, and to carry out the concentration without affecting flavour, colour, or vitamin content of the juice treated. These results are only obtainable by reason of the high degree of vacuum under which the process is carried out.

Accurate Filling.

The distinction of being the only type of automatic filling machine ever adopted by the Government standards is claimed for the Multifiller machine. This machine is of entirely new design, easily sterilised, and gives an absolutely constant calibrated measure, and thus is particularly suitable for syruping, filling sauces and cordials, or in any case where it is desired to fill accurate quantities of any liquid. It is adaptable to all types of bottles and containers, and is produced in numerous sizes, ranging from small hand-operated machines to large automatic conveyor-fed types with outputs of 110 to 1,000 gallons per hour.

Starting a Canning Factory (*Continued from page 287*)

time depends upon the fluidity of the material, as the heat will penetrate quickly if free liquid, brine, or syrup be present, but slowly if the product be fairly heavy or solid. The heat penetration may be greatly aided by rolling or turning the can, thus agitating the contents. The process necessarily depends upon two factors—the resistance of the organism to heat, and the nature of the material, as the latter must be cooked to the proper degree but without injury from too high temperature or prolonged heating. It is upon the use of the proper process that quality depends.

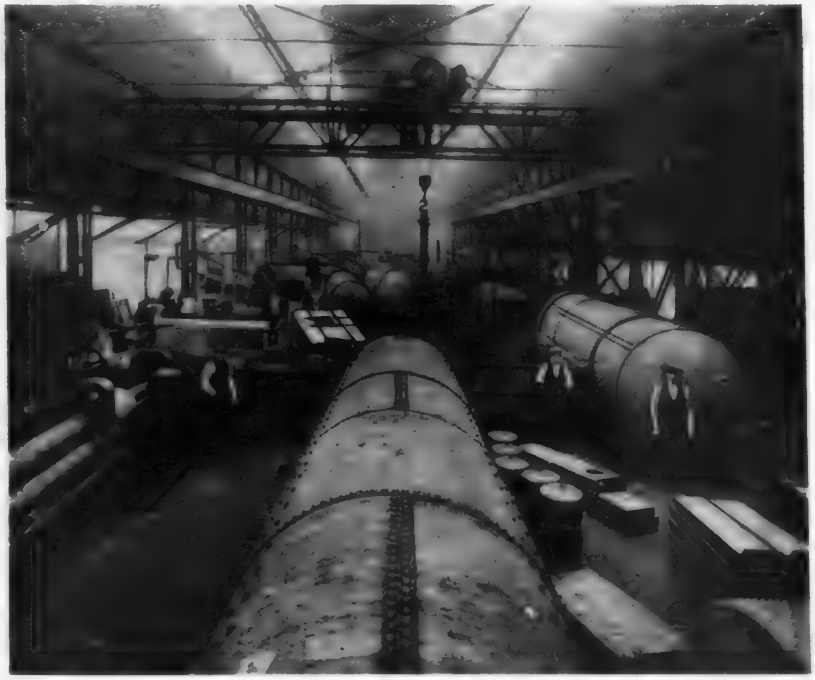
Cooling.

The final step is the cooling of the cans, which is done to prevent prolonged cooking of the product. Different methods are used, as turning cold water into the retort or cooker, removing the cans from the cooker to a cooling tank, spraying the cans in the open, stacking the cans in trays so that air may circulate freely and the cans cool slowly. The method depends largely upon the product and the effect desired.

The Bakers' Exhibition (*Continued from page 293*)

Bakers will not be particularly concerned with the physical principles on which the new methods depend, but will undoubtedly be interested in any method whereby the moisture of any given sample of flour may be read instantaneously by the simple means of filling a container and plunging in a key to complete the circuit, and will eagerly await further developments in this new research. Lack of space makes us defer descriptions of other exhibits till next month.

FOOD MANUFACTURE is sent to any address in the World for 10s. per annum. Send your subscription now to LEONARD HILL, LTD., Thanet House, 231-2, Strand, London, W.C. 2.



View of Engineering Works of Fredk. Braby and Co., Ltd. **(See page 302.)**

The Society of Food Industry

The Announcement in last month's issue of the formation of the Society of Food Industry has evoked remarkable interest. The editor has received many expressions of this interest and offers of support. Thus, the manager of a group of factories "considers this idea to be a very excellent one." Another writes: "I have been in the canning industry for fifteen years and fully appreciate the points you make in your September issue concerning the formation of the society." A works chemist hopes that the scheme will have the warmest support from both manufacturing technicians and analytical and consulting chemists. The principal of the National Bakery School writes that it should prove a useful medium for the pooling of ideas and the dissemination of knowledge.

These are random examples of the general attitude. Founded upon such a basis of goodwill and widespread acceptance by the industry, the stability and future prosperity of the Society is assured.

Readers will be interested to learn that the Society is already housed in attractive quarters at **Suite 6, No. 7, New Square, Lincoln's Inn, London, W.C. 2,** where the surroundings and general atmosphere are ideal for the purpose.

Henceforth all communications relating to the Society should be sent to the above address.

The annual subscription will be one guinea, which is not payable before January.

As soon as definite particulars relating to the constitution and regulations of the Society are available, these will be announced in Food Manufacture.

Correspondence

To the Editor.

Dear Sir,

It may appear strange to many that one who is an advocate of the fusion of various scientific societies should be willing to participate in the formation of a Society of Food Industry.

The time has, however, passed when Accum was able to write: "To such perfection of ingenuity has the system of counterfeiting and adulterating various commodities of life arrived in this country, that spurious articles are everywhere to be found on the market, made up so skilfully as to elude the discrimination of the most experienced judges." At a later stage it was expressed more forcibly that half the chemists in this country were engaged in the adulteration of food and other products, while the other half tried to detect the adulteration.

In the same way, the age of secrecy has passed—likewise, that of empiricism—never to return, we hope. As you remark in the last issue of this journal, secrets can no longer be guarded for any length of time under present-day conditions—at least the principles are open to every food technician and the details can be readily worked out to meet special requirements. With regard to empiricism, one has but to look round and see the well-organised control of modern manufacture, on the one hand, and the disappearance of the backyard cook-houses on the other, to appreciate the trend of the times.

Most of the recent improvements in the preparation and preservation of foodstuffs have originated, not in the laboratories of their critics, but in those of the manufacturer, whose main object at the present time is to supply the public with the best possible article at the lowest possible price commensurate with the quality he supplies.

It is well known that if manufacturer A. is looking for an article of plant, an ingredient for a foodstuff, or a method of preservation, he will approach various suppliers of the required article, and, in order to be satisfied as to its efficiency, will require to know that manufacturer B. has found the particular article especially suitable for his particular line. I feel, therefore, that it is essentially in our own interests as technicians that we should have a common meeting-ground where A. and B. can discuss their problems frankly and openly rather than by the hole-and-corner methods which are, even now, much too prevalent.

If I may be allowed one word of criticism, I would suggest that the society should make no claim with regard to raising the status of the technician. There are already a multiplicity of qualifying bodies in existence, and it would be detrimental rather than otherwise to allow membership of the society to be used as indication of efficiency, which would result from the inclusion of object (4) quoted in your last issue. Rather should an attempt be made to include the non-scientific, yet in reality equally scientific, buyer, seller, and advertiser of foodstuffs so that the whole range of food technology may be equally discussed on our platform.

Thomas McLachlan.

To the Editor.

Dear Sir,

In your Trade Notes for July, 1931, there is a description of certain rubber rings, and mention is made of the low free sulphur content (under 0·5 per cent.), and the special precautions taken to avoid anything which might damage the tin or the contents.

Gold seal cap compounds have been used for some years all over the world for sealing packs of different kinds, and when we first started experimental work on cap compounds for meat packs, we, too, found blackening of the caps. We thought at first that free sulphur in the vulcanised cap compound was the cause, and developed a compound which has a free sulphur content of 0·15 per cent. We found that even with this compound there was frequently a considerable amount of blackening in the ordinary tinplate container; furthermore, this blackening occurred even without a rubber sealing medium.

Our results show that the trouble is not entirely due to free sulphur in the sealing material, but to the sulphur content of most meats. This reacts with the iron in the tinplate, forming that dark grey or black surface to which objection is rightly raised.

The remedy lies not only in the choice of a suitable seal, but in the container itself. We always recommend a lacquered or "enamelled" inside to any cap for meat packs, and even then we qualify the statement and say that at least two coats are desirable, using a varnish of suitable quality for the pack. Fortunately for all concerned, there are reputable firms in this country who have produced lacquers that answer the purpose admirably. The solution of the blackening problem seems to us to lie in the use of unscratched, properly lacquered caps, as well as a sealing material having a minimum free sulphur content.

Yours faithfully,

Dewey and Almy, Limited.

Enquiries

Enquiries are dealt with immediately on receipt, and the desired information is communicated in full by private letter. The replies given below are merely brief abstracts or indications that the names and addresses, or whatever may have been requested, have been supplied. Any further information supplied to us relating to the questions appearing below will be passed on to the enquirers. **N.B.—Enquirers are requested to use the special form in the advertisement section.**

367. *Kindly inform us where we can obtain information on the question of vitamins in margarine.* (London.)

Dr. K. H. Coward contributed a paper to the *Lancet*, October 6, 1928, p. 726, on "The Vitamin Content of Margarine." This is essentially a report on vitaminised samples submitted for test at the laboratories of the Pharmaceutical Society. The results show that these margarines are equal to the best summer butter in their vitamin A and D content.

The Institute of Margarine Manufacturers, of Washington, U.S.A., have issued the following reprints of papers:

Bulletin No. 10. "The Composition and Food Value of Margarine," by J. S. Abbott.

Bulletin No. 11. "The Economics of Vitamins," by W. D. Richardson.

Bulletin No. 12. "False Advertising," by J. S. Abbott.

Also *Good Housekeeping* published (Vol. 88, No. 4, pp. 97, 250-252, April, 1929) an article by Dr. W. H. Eddy entitled "What is Margarine Good For?"

368. *Will you please give us the names of makers of pneumatic grain elevators and conveyors.* (Liverpool.)

Names and addresses of suitable firms were recommended.

369. *Plant for production of potato crisps required.* (London.)

The enquirer was put in touch with a supplier.

370. *Can you recommend firms able to supply good quality dried vegetables and meat extract?* (Sheffield.)

Recommendations were made.

371. *Required, names of firms manufacturing a rotary or other continuous cooking machine for roasting a stream of foodstuff of powdery consistency to the extent of 500 to 600 lbs. per hour.* (London.)

Recommendations made.

372. *We should be obliged if you could put us in touch with the manufacturers of a small hand-driven machine for removing stones from cherries.* (London.)

Recommendations made.

373. *Kindly put us in touch with dealers in wheat germ.* (Bombay.)

This was done.

374. *We should be much obliged if you will give us a list of the leading manufacturers of milk pasteurisers in this country.* (Manchester.)

Such a list was furnished.

375. *We should be glad to have your assistance in finding the manufacturer of a machine capable of printing and stamping continuously cards similar to the samples enclosed.* (Glasgow.)

This was done.

376. *We should be glad of your help in this matter. We propose having the inside and stirrer arms of an iron-jacketed pan tinned. The tinners will be using spirits of salt for cleaning the pan primarily, and they assure us that after tinning there will be no trace left. Do you think we should be quite safe in having this done?* (Hull.)

We see no reason at all why spirits of salt (hydrochloric acid) should not be entirely removed by thorough washing with hot water. In any case, traces are not poisonous.

377. *Kindly supply some information or refer us to literature on tonic medicated wines.* (Bombay.)

What are commonly understood as medicated wines are now fast disappearing. Medicated wines, strictly speaking, refer to wines to which a medicament, pure and simple, has been added, or to those in which a wine has been employed to extract the medicinal portion of a bark or similar material. It has been found that wines vary considerably in strength and composition, and that tinctures made from alcohol of known strength are much more effective.

There is still a considerable market, however, for what are known as invalid wines—that is, wines to which meat extract and/or malt extract have been added. Authorities differ as to whether a cooked or raw meat extract should be employed. It is stated that when raw meat juice is used for addition to wine of good strength the albumin is at once precipitated, whereas meat extract—that is, a cooked extract—is more or less soluble in most wines. The usual amount of meat extract to add is $2\frac{1}{2}$ ozs. per gallon of wine, while from $2\frac{1}{2}$ to 4 ozs. of malt extract may be used. Although it is always said that only the best quality wines are employed for this purpose, in reality they are usually a cheap Spanish or Portuguese wine of the port type.

The method of procedure is to rub down the meat and malt extracts with the wine, to leave for one or two weeks to settle, and then to decant and filter. You will probably find further information in the U.S. National Formulary.

378. *In last month's issue of* FOOD MANUFACTURE *we notice some comments on page 264 on the value of gelatine in foodstuffs. We should be glad to have further information on this point of dietetic values.* (Manchester.)

In reply to your enquiry regarding the dietetic value of gelatine, we think the following quotation will be helpful to you. This was issued a couple of years ago by the Canadian Government:

"As part of the normal diet, gelatine is of great value; it is an excellent emulsifying agent, and as a protective colloid it is unsurpassed by any other known substance. The value of gelatine in milk for infants is well known; and it has been shown that under-nourished children of even six to thirteen years gained, through the use of gelatined milk in their regular diet, a greater weight than when plain milk was so used.

"Gelatine is digested more easily than perhaps any other protein, and a small addition of it to certain foods greatly aids their assimilation and absorption; and, consequently, it is much used in foods for fever, tuberculosis, diabetic, and dyspeptic patients. Invalid jellies often contain over 5 per cent. of gelatine.

"Though gelatine, like most proteins, is an incomplete protein, it functions as a food, is a source of energy, and supplies certain essential amino acids in which other proteins are usually deficient. Some authorities state that the addition of gelatine to the diet in an amount that will give 12 per cent. of the required energy reduces the decomposition of body protein by 27 per cent."

If you require further information the following might be of interest to you:

"Use of Gelatine in Buttermilk," by B. C. Bates. (*The Milk Dealer*, December, 1927.)

The Use of Gelatine in Buttermilk. (Pamphlet by T. G. Yaxis, Assistant Professor of Dairying, Massachusetts Agricultural College.)

Recipes Using Gelatine. (Published by the Home Economics Bureau for Gelatine, New York.)

"A Study of the Nutritive Value of Gelatine," by T. B. Downey. This cites literature. (Paper presented to Division of Biological Chemistry of the Assn. Chem. Soc., September 11, 1924.)

A number of other papers by Downey, Senior Industrial

Fellow, Mellon Institute of Industrial Research, University of Pittsburg, U.S.A.

Reprints of various papers issued by the Edible Gelatine Manufacturers' Research Society of America, Inc., New York City, N.Y., U.S.A.

A booklet on *Gelatine for Ice-Cream, Confectionery, etc.*, is distributed by the Essex Gelatine Co., of Boston, Mass., U.S.A.

"Pure Food Gelatin," by M. Briefer and J. H. Cohen. (*Ind. and Eng. Chem.*, p. 408, April, 1928.)

Gelatine as a Food, by Dr. A. Neff of the Mellon Institute.

379. *Advice required on the best method of keeping sausage in a dry condition after packing and thus preventing spoilage.* (Scotland.)

It is difficult to give a straightforward answer to this enquiry, as it may be due to one or several of a number of causes.

Certainly cooling in the refrigerator is not the thing to do. Another point is that the use of hot air with the aid of a fan for drying purposes is most undesirable, as this will spoil the appearance of the sausages. It is, of course, possible that you have too much moisture in the sausages. Could you give me an idea of the water content of the sausages, as this would help? Then, again, are the skins, which are wet when placed on the stuffing horn, well squeezed before actually being filled?

The best method for drying the surface of sausage skins is to place them on a travelling belt in a small tunnel through which passes a slow current of air.

Then, again, the method you adopt in packing is an important consideration. It appears to us that if sausages are packed in a container which does not allow free circulation of air the confined space will become saturated with moisture on a rise of temperature, and on a fall of temperature this moisture would be deposited on the surface of the sausages.

380. *Information requested on the mixing of dry malt powder with milk powder. The hygroscopic nature of the former makes this a difficult process.* (Kent.)

In making malted milk powders it is usual to mix the malt extract with the milk before drying. However, there is apparently no reason why the two materials in powder form should not be mixed if both are in a perfectly dry condition, and the operation is done quickly in a dry atmosphere. An ordinary trough mixer—*e.g.*, the type made by Messrs. Wm. Gardner and Sons, of Gloucester—would, no doubt, be suitable for this operation.

We do not see how you can overcome the hygroscopic nature of this material, particularly the malt powder, and we doubt, even if you arrange to mix the matter in a perfectly fresh condition immediately on emptying from the can, whether you could get an intimate mixture. On the other hand, there seems to be no reason why you should aim at getting anything more than a reasonably good mixing, since the mixture has to be dissolved afterwards.

381. *A request for a method of preventing discoloration of pickled red cabbage stored in casks, and preserving its original texture, etc.* (Kent.)

Pickle makers would like to know the same thing, and research is going on at the present time with the object of trying to solve the problem. We should imagine that one of the factors determining spoilage would be the presence of air. No doubt there are other factors involved. It is worth turning up an article on "Methods and Problems in Pickle Manufacture," published in July, 1930, issue of this journal.

Some idea of the nature of the problem may be gathered from a study of Carl Pederson's work on floral changes in the fermentation of sauerkraut (*Bulletins* Nos. 168 and 169, July and September, 1930, New York State Agricultural Experiment Station). Reference may also be made to Professor W. V. Cruess's work (University of California) and to the work of Professor F. W. Fabian (Michigan State College of Agriculture and Applied Science), both of whom have carried out research work on pickle products and vinegars. We suggest you should get in touch with these two authorities.

382. *Kindly indicate the best way of processing blood for cattle food or fertiliser purposes. What is the usual yield?* (Liverpool.)

Where it is possible to control the handling of blood at the point of collection in the slaughtering booths or pens in the abattoir, and where it is desired to obtain the best products therefrom, the blood may be allowed to coagulate and the serum separated from the clot, the serum then being dealt with in a suitable plant for the production of blood albumen. The clot may be reduced to blood powder for use as cattle food or fertiliser. The reduction of the clot to dry powder should be effected at a low temperature, preferably in vacuum dryers. This is desirable on two grounds, conservation of nitrogenous content and sanitary efficiency. We understand the blood yields about 25 per cent. of dried product.

383. *We are desirous of getting in touch with one or two good houses importing herbs.* (Liverpool.)

Recommendations were made.

384. *In the August, 1931, issue on page 239 (Enquiry 331), it doesn't seem that you have given Nutrl-Jel powdered apple pectin a very fair showing. You make the remark that marmalades must be made from citrus fruit only, but we disagree with you when you state that the pectin itself, even though it has been extracted from apples, cannot be used with citrus fruits or any kind of fruit. A comparison of the two products made from the powdered apple pectin and the citrus pectin shows a different type of set that we feel is very much in favour of the powdered apple pectin.*

Answering the question of your reader, it seems that you have disregarded any reference to a powdered apple pectin, and I believe your reader would have been interested in securing some information about Nutrl-Jel also. I hope you will reconsider your conclusions regarding whether pectin itself, even if it is extracted from apples, can be added to citrus fruit marmalades.

Please remember that powdered apple pectin is a substance and is extracted from the fruit and is not like adding another fruit juice. We agree with you that a liquid apple pectin should not be used in a citrus marmalade, but the powdered product is quite different. I am just calling this to your attention for you to consider on future enquiries. (Kansas City.)

If you will turn to Enquiries 357 and 358 (pages 270 and 271, September issue) you will notice that we have made reference to powdered apple pectin and to Nutrl-Jel. The following is the opinion of T. N. M. on this question:

"The statement that marmalade must contain citrus pectin only is part of the regulations agreed to between the Public Analysts and Jam Manufacturers (*Analyst*, November, 1930, p. 697), and it does not appear to provide for the addition of apple pectin, or even citrus pectin for that matter.

"I take it that those who framed the policy recognised that since oranges or other citrus fruits in good condition contain an abundance of pectin the addition of more is unnecessary.

"Personally, I see no difference between the addition of powdered citrus pectin and powdered apple pectin to marmalade or any other jam, since both are tasteless and practically colourless products with much the same chemical composition. I cannot see that the statement in the August issue of FOOD MANUFACTURE misinterprets the regulations, but, if it can be proved that citrus pectin is used in marmalade and its use permitted, I see no reason why you should not make strong representations to the authorities concerned in order to get the use of a pure pectin from apples regularised."—T. N. M.

385. *References to literature on food poisoning and food preservation requested.* (Preston.)

A complete answer to this would fill the whole of this journal. We advise reference to the bibliography section of Food Industries Manual and to the Index to the Literature of Food Investigation (Dept. of Scientific and Industrial Research).

Notable publications on food poisoning are:

Report 92, Medical Research Council, by Savage and Bruce.

Canned Foods in Relation to Health, 1923, by Savage.

Food Infections and Food Intoxications, 1928, by S. R. Damon.

Financial News

(SPECIALLY COMPILED BY S. HOWARD WITHEY, S.F.INT.A.C., F.C.I., ETC.)

The Editor cannot accept responsibility for any errors which may appear in the Financial News Section

BANK RATE (1930–1931)

1930.	February 6	4½ per cent.
,,	March 6	4 ,,
,,	March 20	3½ ,,
,,	May 1	3 ,,
1931.	May 14	2½ ,,
,,	July 23	3½ ,,
,,	July 30	4½ ,,
,,	September 20	6 ,,

The **Metal Box Co., Ltd.**, owns all, or nearly all, the shares of several firms of metal box manufacturers and printers, and was registered as a private concern in 1921, the conversion into a public company taking place in 1930, when the name was changed. The accounts are made up to March 31, and during 1930-1931 a net profit of £103,480 was realised, enabling a dividend of 8½ per cent. to be paid on the ordinary share capital. The authorised share capital is £2,000,000—viz., £800,000 in 7 per cent. cumulative preference shares, and £1,200,000 in ordinary shares, all of £1 each, but only £1,236,783 has been issued and paid up, comprising £425,483 preference and £811,300 ordinary shares. After writing off £8,834 and allocating £18,850 to reserve, there remains a balance of £2,115 to go forward as against £2,086 brought in, thus:

	£	£
Brought forward from 1929-1930	2,086	
Net Profit—year ended March 31, 1931	103,480	
Disposable Balance		£105,566
7% dividend on £425,483 Cumulative Preference £1 Shares		22,438
8½% dividend on £811,300 Ordinary £1 Shares		53,329
Amount written off		8,834
Transferred to Reserve		18,850
Carried forward to 1931-1932		2,115
		£105,566

In 1929-1930 a dividend of 12½ per cent. was paid.

In 1929-1930 a net profit of £2,288 was realised by **W. and J. McLintock, Ltd.**, preserve manufacturers, confectioners, etc., but during the financial year ended March 31 last a loss of £1,466 was sustained. Registered in 1924, the company has an authorised share capital of £55,000, of which £50,000 has been issued and paid up in the form of £30,000 8 per cent. cumulative preference shares of 10s. each and £20,000 in ordinary shares of 1s. denomination. After paying six months' dividend on the preference shares there is a debit balance of £820 to go forward, against a credit balance of £1,576 brought in:

	£	£
Brought forward from 1929-1930	1,576	
Less Loss—year ended March 31, 1931	1,466	
Credit Balance		£110
Half year's dividend on £30,000 8% Cumulative Preference 10s. Shares, less Tax		930
Debit Balance carried forward to 1931-1932		820
		£110

The profit of £4,861 realised by **John Mark and Co., Ltd.**, during the twelve months ended June 30 last compares with a profit of £5,535 for the preceding financial year, and was not sufficient to justify any dividend being paid to the ordinary shareholders. The company was registered in 1894, and the capital ranking for dividend amounted to £90,810, comprising £60,000 in the form of 7 per cent. cumulative participating preference shares and £30,810 in ordinary shares, all of £1 each. The following is a summary of the 1930-1931 appropriation account:

	£	£
Brought forward from 1929-1930	1,057	
Profit—year ended June 30, 1931	4,861	
Disposable Balance		£5,918
7% dividend on £60,000 Cumulative Participating Preference £1 Shares		4,200
Allocated to Debenture Redemption Reserve		1,500
Carried forward to 1931-1932		218
		£5,918

The debenture stock was issued in 1927, and carries interest at the rate of 5½ per cent.

During the year ended June 30 last a profit of £8,481 was realised by **Carsons, Ltd.**, reducing the debit balance to £9,717, which is carried forward. The company was registered in 1906, and the capital ranking for dividend is £225,000, made up of £150,000 10 per cent. cumulative preferred ordinary £1 shares, and £75,000 deferred ordinary £1 shares.

The final figures of **Grape Produce, Ltd.**, are made up to April 30 each year, and during 1930-1931 a loss of £8,206 was sustained. This company was registered three years ago for the purpose of acquiring a process for the manufacture of wine from concentrated grape juice, and manufactures imports and distributes Empire wines. All the authorised share capital of £130,000 has been issued and paid up, comprising £100,000 in the form of 8 per cent. participating preferred ordinary shares of 5s. each and £30,000 in deferred shares of 1s. each. After taking credit for £1,420, representing profit on the realisation of investments, the debit balance to be carried forward will amount to £10,182, as shown below:

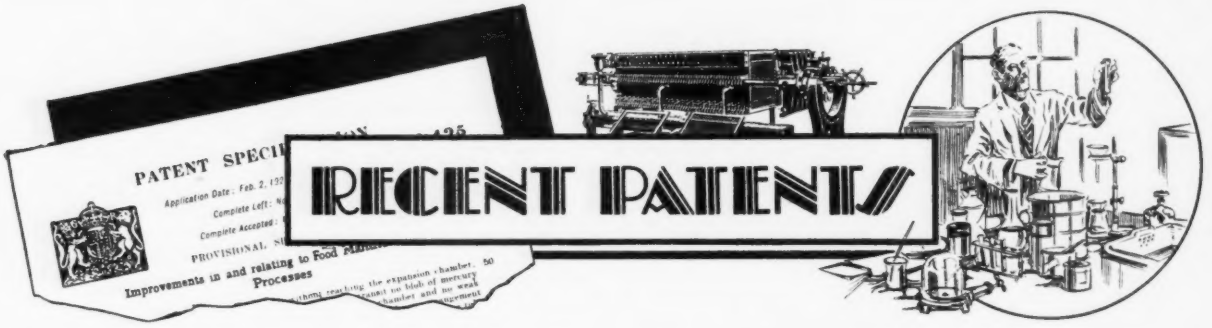
	£	£
Debit Balance brought forward from 1929-1930	3,396	
Add Loss—year ended April 30, 1931	8,206	
		£11,602
Less Profit on Realisation of Investments	1,420	
Debit Balance carried forward to 1931-1932		£10,182

Very satisfactory results are shown in the accounts of **Hunters the Teamen, Ltd.**, for the financial year ended June 27 last, the balance of net profit working out at £68,454 as compared with £56,712 realised during the preceding twelve months. The disposable balance was brought up to £83,055 by the addition of £14,601 brought forward from 1929-1930, and this enables a final dividend of 10 per cent. to be paid on the ordinary share capital, making 13¾ per cent. for the year, an interim dividend of 3¾ per cent. having been paid in January last. This compares with a dividend of 12½ per cent. distributed during each of the preceding two years. The company was registered in 1897, the authorised capital being £435,000 in £1 shares, of which a total of £434,930 has been issued and paid up, consisting of £90,000 in 7½ per cent. cumulative preference shares, £114,930 in 7½ per cent. preferred ordinary shares, and £230,000 in ordinary shares. The 1930-1931 profit appropriation account is made up as follows:

	£	£
Brought forward from 1929-1930	14,601	
Net Profit—year ended June 27, 1931	68,454	
Disposable Balance		£83,055
7½% dividend on £90,000 Cumulative Preference £1 Shares		6,750
7½% dividend on £114,930 Preferred Ordinary £1 Shares		8,620
13¾% dividend on £230,000 Ordinary £1 Shares		31,625
Transferred to General Reserve		20,000
Carried forward to 1931-1932		16,060
		£83,055

STOCK AND SHARE LIST

	Sept., 1931.	*Par Value.*	*Aug.*, 1931.
Aerated Bread : Ord. ...	18/-	£1	19/4
6½% Pref.	21/3	£1	21/5
Apollinaris : Ord.	4/3	£1	4/2
Assoc. Biscuit : 6½% Pref. ...	22/9	£1	22/-
Avery (W. and T.) : Ord. ...	45/-	£1	46/-
5% "A" Pref.	4½	£5	4⅝
5½% "B" Pref. ...	20/-	£1	20/6
Benger's Food : Ord. ...	28/3	£1	28/-
6% Pref.	5½	£5	5⅛
Bovril : Ord.	23/10	£1	23/9
Deferred	31/-	£1	33/6
6% Pref.	22/7	£1	22/6
4½% Deb.	92	£100	92½
British Aluminium : Ord. ...	27/3	£1	27/3
6% Pref.	20/-	£1	20/-
British Thomson Houston :			
7% Pref.	22/9	£1	23/5
Bucknall (H.) and Sons :			
Ord.	22/-	£5	22/-
Cadbury : 6% Pref.	23/9	£1	24/3
8% 2nd Pref.	28/9	£1	29/-
Callard, Stewart and Watt :			
6% Pref.	16/10	£1	18/9
Carrs : 6½% Pref.	19/-	£1	21/6
Cerebos : Ord.	5¾	£1	5⅞
Chivers : 6% Deb.	102	£100	100½
Cinzano : 7½% Pref. ...	21/-	£1	20/9
Clark's Bread : Ord. ...	22/8	10/-	22/6
Cow and Gate : 7½% Pref.	22/7	£1	22/6
Criterion Restaurants : Ord.	6/3	5/-	6/9
Crosse and Blackwell : Ord.	5½d.	1/-	6d.
7½% Pref.	4/6	15/-	4/7
6½% Deb.	78	£100	79
Dutch Margarine : 5½% Pref.	21/-	£1	21/4
English and Dutch Meat :			
8% Deb.	51	£100	50
Ewart and Son : Ord. ...	10/3	5/-	10/6
16% Pref.	19/3	10/-	19/6
Foster Clark : Ord.	42/3	10/-	36/3
Fry's : 8% "B" Preferred	23/-	£1	22/6
Fullers : Ord.	34/6	£1	34/-
7% Pref.	21/9	£1	20/3
Gordon Hotels : Ord. ...	7/-	£1	6/9
4% Perp. Deb.	67	£100	66½
Grape Produce :			
8% Ptg. Pf'd. Ord. ...	1/6	5/-	1/5
H.P. Sauce : Ord.	85/9	£1	91/3
Hill (W.) : Ord.	5/6	£1	5/3
Holbrooks : Ord.	12/3	5/-	12/6
5% Pref.	4½	£5	4½
Home and Colonial : Ord. ...	12/9	4/-	14/6
15% Cum. Ord.	49/-	£1	55/-
6% Cum. Pref.	5¾	£5	6
Honywood Hotels : Ord. ...	1/8	2/6	1/7
8% Pref.	12/6	£1	12/6
Hovis : 6% Cum. Pref. ...	22/9	£1	23/3
Imperial Chemical : Ord. ...	11/9	£1	12/6
Deferred	3/-	10/-	3/3
7% Cum. Pref.	18/-	£1	19/6
International Tea : Ord. ...	20/-	5/-	22/4
6% 1st Pref.	23/6	£1	23/9
7% "A" Pref.	25/8	£1	26/6
Jones (R. E.) : Ord.	1/3	5/-	1/6
10% Pref.	6/10	£1	6/9
Jurgens :			
7% Cum. Partg. Pref. ...	23/-	£1	24/-
Kia-Ora : Ord.	6/6	10/-	7/3
Liebigs : (Reg.)	8¼	£5	9½
(Bearer)	8¼	£5	8⅝
5% Pref.	92/6	£5	95/3
Lipton : Ord.	5/6	1/-	5/6
5% 1st Pref.	8/9	10/-	8/9
6% Pref.	11/6	10/-	10/9
6% Deb.	103	£100	102
Lovell and Christmas : Ord.	11/6	£1	11/10
Lyons : Ord.	89/-	£1	93/2
"A" Ord.	86/-	£1	91/-
5% Pref.	21/6	£1	21/6
6% Preferred Ord. ...	22/6	£1	23/-
7% Pref.	27/-	£1	27/3
8% Pref.	30/9	£1	31/2
Manbre and Garton : D'f'd.	13/-	2/-	13/1
Mather and Platt : Ord. ...	21/6	£1	21/3
Maypole Dairy :			
20% Preferred	17/-	5/-	17/-
Deferred	3/9	2/-	4/6
5% Pref.	19/6	£1	19/6
Mazawattee Tea : Ord. ...	11/-	6/8	11/3
Meadow Dairy : 7½% Pref.	24/6	£1	24/6
Mellin's Food : 6% Cum. Pref.	2/6	£1	1/6
Molassine : 7% Pref. ...	12/6	15/-	12/10
Nathan (J.) : Ord.	1/2	1/-	1/2
7% Pref.	15/-	£1	15/-
8% Preferred	5/10	10/-	5/9
Nestlés : 8% Pref.	27/6	£1	30/-
Parkinson and Cowan : Pref.	16/-	£1	18/6
Pascall (J.) : 8% Preferred	5/8	£1	5/7
Peak Frean : 5% Pref. ...	18/3	£1	18/9
8% "A" Pref.	26/-	£1	25/6
Radcliffs Edible : Ord. ...	1/1	1/-	1/1
8% Pref.	6/10	10/-	6/9
Radiation : Ord.	31/-	£1	33/6
6% Pref.	22/-	£1	22/2
Rowntree : 7% 2nd Pref. ...	21/8	£1	21/6
Salt Union : Ord.	22/6	£1	23/-
7% Pref.	27/9	£1	28/6
4½% Deb.	83¼	£100	83
Schweppes : Deferred ...	18/6	£1	22/8
4% Deb.	77	£100	78
Scribbans : Ord.	11/6	£1	12/10
Deferred	1/6	1/-	1/8
Slaters and Bodega : Ord. ...	25/6	£1	26/6
6½% 2nd Pref.	20/6	£1	21/9
Smithfield and Argentine Meat :			
7½% Cum. Pref.	15/3	£1	15/3
Smith's Potato Crisps : Ord.	7/6	5/-	8/-
Spiers and Pond : Ord. ...	11/-	10/-	13/9
6½% Pref.	21/-	£1	21/-
5% Deb.	96	£100	97
Spillers : Ord.	28/-	£1	29/-
6% Pref.	21/-	£1	21/-
Deferred	12/-	£1	13/-
Strand Hotel : Pref'd. Ord.	63/3	£1	64/9
Tate and Lyle : Ord. ...	33/-	£1	37/3
6½% Pref.	24/-	£1	24/3
Trust Houses : Ord. ...	13/6	£1	13/6
Unilever : Ord.	27/-	£1	29/6
7% Preferred	23/-	£1	25/-
Union Cold Storage :			
6% Pref.	21/-	£1	21/-
7% Pref.	21/6	£1	21/9
10% Pref.	27/3	£1	27/6
United Caterers : Ord. ...	8d.	5/-	7½d.
United Dairies : Ord. ...	32/9	£1	33/6
6% Pref.	23/-	£1	23/3
United Glass Bottle : Ord. ...	17/9	£1	17/9
Preferred	23/-	£1	22/9
United Molasses : Ord. ...	8/-	£1	10/4
6% Pref.	9/3	£1	10/6
Van den Berghs :			
15% Preferred Ord. ...	9/3	5/-	10/9
Victoria Wine : Ord. .	4/9	5/	5/6
8% Pref.	20/3	£1	20/6



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Latest Patent Applications

23824. MONEY, E. D.: Apparatus for preparation of hot beverages. August 25.
23122. FERRIOLS, J. M. B.: Colouring rice, etc. August 17.
23101. WALMSLEY, J.: Cans for food, etc. August 17.

Specifications Published

354,404. MOORE, W. G.: Arc electrodes for use in therapeutic treatment of food and in like processes.
354,535. FROHRING, W. O.: Milk or cream preparation.
354,771. MUCH, H.: Process for treating tea and coffee.
354,806. HOBART MANUFACTURING CO.: Apparatus for the mechanical treatment of food.
355,501. UHL, J. (trading as Uhl's Sohne, J.): Drying dough-pieces, such as macaroni.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

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350,831. **Food preparations.** GATES, W. R. B. ST. J., Arolla, Warren Road, Guildford, and TAVROGES, J., 4, The Mall, Surbiton, both in Surrey.

A peptonised food is obtained by digesting milk and starch separately with pancreatic extract, then mixing them together, and finally drying or condensing, the food being prepared for consumption by mixture with water. The proportions of milk, starch, and extract used are substantially as in the following example: 12 gallons of milk are diluted with 2½ gallons of water, and 8 ozs. of a pancreatic extract containing essentially trypsin are added, and the mixture is kept for thirty minutes at about 120° F. in a covered sterile vessel. 5 lbs. of baked wheat flour are stirred to a thin paste with a gallon of water, and 2 ozs. of pancreatic extract containing essentially amylopsin are stirred in, and the mixture kept at about 120° F. for about thirty minutes. The milk and flour preparations are then mixed well together, cooled to about 45° F., and then finally condensed or desiccated.

350,758. **Preserving meat, poultry, etc.** PITCHFORD, H. WATKINS, Oatlands Drive, Weybridge, Surrey.

Meat, poultry, etc., is preserved by coating with blood serum obtained from the same or another animal. The serum may be separated by allowing the blood to stand or by centrifuging, and may be applied to the meat by brushing, spraying, etc.

350,670. **Milk preparations.** GATES, W. R. B. ST. J., TAVROGES, J., and COW AND GATE, LTD., Stoke Road, Guildford, Surrey.

A milk preparation for use in making confectionery and in baking, etc., is obtained by mixing dried milk powder and sugar, adding water and stirring to a creamy consistency, then heating under vacuum with stirring to give a doughy mass, which is shaped in moulds and allowed to cool, a substantially solid mass being obtained. A mixture of 56 parts by weight of milk powder and 45 parts of sugar may be used. An emulsifying or binding agent—*e.g.*, agar or sodium citrate—may be added to the mixture, and a flavouring—*e.g.*, vanilla—may also be added at the same time as the water, which is preferably heated to 140° F.

Recent Trade Marks

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SUNSHINE.—523,563. **Canned fruits, canned vegetables, canned fish, margarine, and butter.** LIPTON, LTD., 196, City Road, London, E.C. 1. August 26. (Associated.)

GOLDEN TORS.—524,274. **Sausages, mayonnaise, salad dressing, potted meats, butter, cheese, and cream.** THE DUCHESS OF DEVONSHIRE DAIRY CO., LTD., Tiverton Junction, Cullompton, Devon. August 26.

STELLA.—523,477. **Chocolates and sugar confectionery.** CLARKE, NICKOLLS AND COOMBS, LTD., Clarnico Confectionery Works, Wallis Road, Victoria Park, London, E. 9. August 19. (By Consent.)

KELTO.—523,227. **Table salt and gravy salt.** CEREBOS, LTD., Cerebos Works, Station Road, Greatham, Co. Durham. August 19. (Associated.)

SEA TREASURE.—523,178. **Canned fish and canned fruit.** ALEXANDER CRICHTON AND CO., LTD., 15, Stanley Street, Liverpool, and St. Magnus House, Monument Street, London, E.C. 3. August 19.

GOLDEN HOURS.—523,153. **Canned and preserved fruits.** NEEDLER'S, LTD., The Chocolate Factory, Bournemouth Street, City and County of Kingston-upon-Hull. August 19.

BUCKO.—514,546. **Peanuts (for food) for sale in Great Britain and Ireland.** OVERSEAS NUT AND PRODUCE, LTD., 32, Broad Street House, Old Broad Street, London, E.C. 2. August 12. (By Consent.)

MALTOVA.—519,732. **A granular or powdered preparation containing malt for making a beverage.** CHARLES WILLIAM HOPKINS, 35, Balmoral Gardens, West Ealing, London, W. 13. August 12.

SUNBAR.—522,955. **Canned fruit and canned vegetables.** BERROW FRUIT, LTD., Martley, Worcestershire. August 12.